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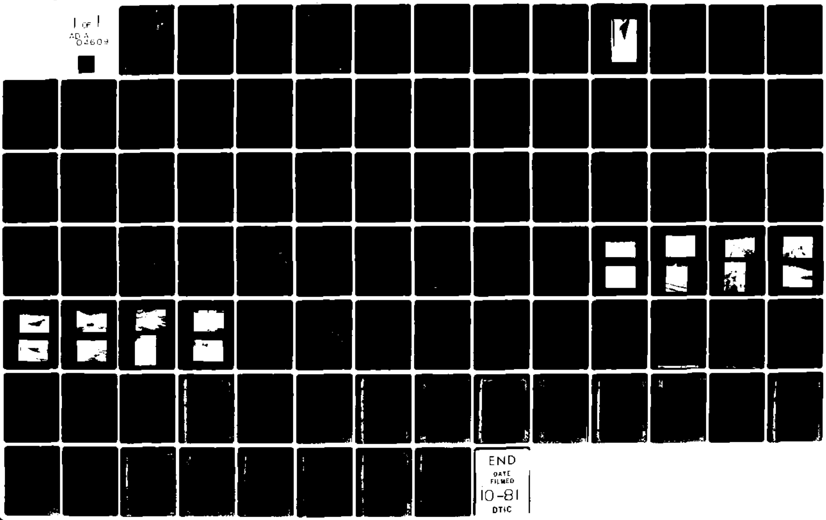

LEVEL II

MISSISSIPPI·SALT·QUINCY RIVER BASIN

AD A104609

DAVID R. WILSON DAM
SHELBY COUNTY, MISSOURI
MO. 10242

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

St. Louis District

PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

DECEMBER 1979

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: David R. Wilson Dam, Phase I Inspection Report

This report presents the results of field inspection and evaluation of the David R. Wilson Dam (MO 10242).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District and requires prompt remedial action be taken to insure the stability of the downstream slope.

Also, unsafe conditions exist due to the following:

a. Inadequate spillway that will not pass the Probable Maximum Flood.

b. Overtopping that could result in dam failure.

Submitted By: SIGNED — Chief, Engineering Division — 11 JAN 1980 Date

Approved By: SIGNED — Colonel, CE, District Engineer — 14 JAN 1980 Date

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DAVID R. WILSON DAM
SHELBY COUNTY, MISSOURI

MISSOURI INVENTORY NO. 10242

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
CONSOER, TOWNSEND AND ASSOCIATES, LTD.
ST. LOUIS, MISSOURI
AND
ENGINEERING CONSULTANTS, INC.
ENGLEWOOD, COLORADO
A JOINT VENTURE

UNDER DIRECTION OF
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
FOR
GOVERNOR OF MISSOURI

DECEMBER 1979

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam: David R. Wilson Dam, Missouri Inv. No. 10242

State Located: Missouri

County Located: Shelby

Stream: Tenmile Creek

Date of Inspection: August 24, 1979

Assessment of General Condition

David R. Wilson Dam was inspected by the engineering firms of Consoer, Townsend and Associates, Ltd., and Engineering Consultants, Inc. (A Joint Venture) of St. Louis, Missouri according to the "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed by the Chief of Engineers, U.S. Army, Washington, D.C., with the help of Federal and State agencies. The resulting guidelines are considered to represent a consensus of the engineering profession.

Based on the criteria in the guidelines, the dam is in the high hazard potential classification, which means that loss of life and appreciable property loss could occur in the event of failure of the dam. Within the estimated damage zone of three and one-half miles downstream of the dam are three dwellings, two buildings and State Highway 151 crossing, which may be subjected to flooding, with possible damage and/or destruction, and possible loss of life. David R. Wilson Dam is in the intermediate size

classification since it is less than 40 feet high but impounds more than 1,000 acre-feet of water.

Our inspection and evaluation indicates that the spillway of David R. Wilson Dam does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. David R. Wilson Dam being an intermediate size dam, with a high hazard potential, is required by the guidelines to pass the Probable Maximum Flood without overtopping. Since there is high hazard potential downstream of the dam, the appropriate spillway design flood for this dam is the Probable Maximum Flood. It was determined that the reservoir/spillway system can accommodate 27 percent of the Probable Maximum Flood without overtopping the dam. Our evaluation indicates that the reservoir/spillway system will accommodate the 100-year flood without overtopping.

The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The 100-year flood is defined as a flood having a one percent chance of being equalled or exceeded during any given year.

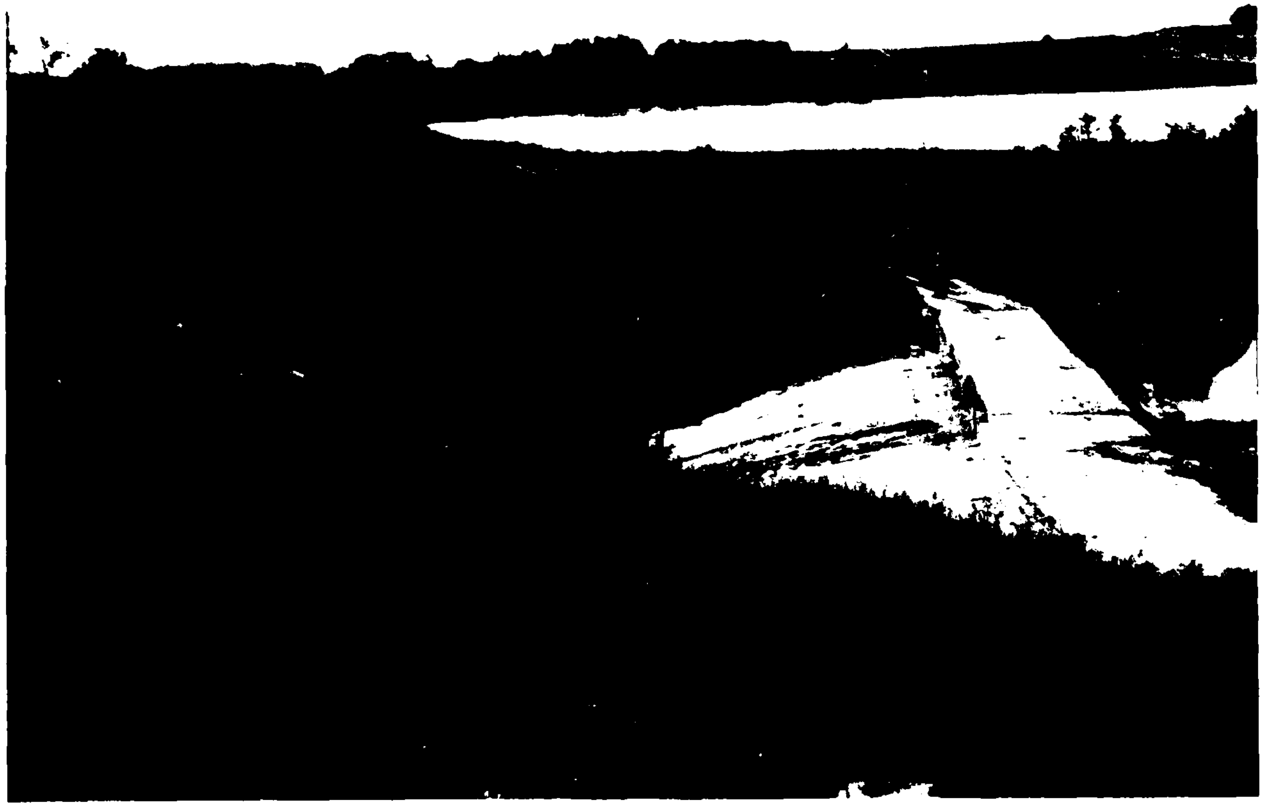
Another major deficiency with David R. Wilson Dam is the deteriorating condition of the downstream slope. Numerous longitudinal cracks were observed along the downstream edge of the dam crest, ranging in width from 1/4-inch to 12-inches and in depth from 1-inch to 3 feet. Scarps due to past slope movement were visible on the slope. These observations indicate serious instability problems that may result in failure of the dam embankment.

Other deficiencies noted by the inspection team were: the erosion and sloughing of the upstream slope; the erosion gully on the right abutment; the standing water located at the toe of the dam; the erosion in the downstream channel; the trees and vegetation on the downstream slope; a need for periodic inspection by a qualified engineer and a lack of maintenance schedule. The lack of stability and seepage analyses on record is also a deficiency that should be corrected.

It is recommended that the owner take immediate action to correct the deteriorating condition of the downstream embankment slope, and correct or control the several deficiencies described above in the near future.

Walter G. Shifrin, P.E.

STATE OF MISSOURI
WALTER
G. SHIFRIN
NUMBER
E-8834
REGISTERED PROFESSIONAL ENGINEER



Overview of David R. Wilson Dam

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

DAVID R. WILSON DAM, I.D. No. 10242

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NATIONAL DAM SAFETY PROGRAM

DAVID R. WILSON DAM, Missouri Inv. No. 10242

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The Dam Inspection Act, Public Law 92-367 of August, 1972, authorizes the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspections. Inspection for David R. Wilson Dam was carried out under Contract DACW 43-79-C-0075 between the Department of the Army, St. Louis District, Corps of Engineers, and the engineering firms of Consoer, Townsend & Associates, Ltd., and Engineering Consultants, Inc. (A Joint Venture), of St. Louis, Missouri.

b. Purpose of Inspection

The visual inspection of David R. Wilson Dam was made on August 24, 1979. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam embankment and its appurtenant structures.

c. Scope of Report

This report summarizes available pertinent data relating to the project; presents a summary of visual observations made during the field inspection; presents an assessment of hydrologic and hydraulic conditions at the site; presents an assessment as to the structural adequacy of the various project features; and assesses the general condition of the dam with respect to safety.

Subsurface investigations, laboratory testing, and detailed analyses were not within the scope of this study. The conclusions drawn herein, therefore, are based on the presence of, or absence of, obvious signs of distress. No warranty as to the absolute safety of the project features is implied by the conclusions presented in this report.

It should be noted that reference in this report to left or right abutments is as viewed looking downstream. Where left abutment or left side of the dam is used in this report, this also refers to the northwest abutment or side, and right to the southeast abutment or side.

d. Evaluation Criteria

Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in the publication "Recommended Guidelines for Safety Inspection of Dams", Appendix D. These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 Description of the Project

a. Description of Dam and Appurtenances

It should be noted that design drawings are not available for the dam or appurtenant structures. The following description is based exclusively on observations and measurements made during the visual inspection.

The dam is an earthfill structure between earth abutments. The crest width of the embankment is 32 feet with a length of 1930 feet. The crest elevation is approximately 762 feet above M.S.L. The maximum height of the embankment was measured as 30 feet. The upstream slope was measured from 1V to 4H to near vertical from the water surface to the crest. The downstream slope varies from 1V to 2.75H to 1V to 1.9H. No riprap was provided as slope protection on the upstream slope.

The spillway for David R. Wilson Dam is a cut into the left abutment. The spillway is an uncontrolled, concrete weir. The control section of the spillway is 133 feet long and has a crest width of 10.5 feet. Discharges over the weir drop 2.5 feet vertically into 100 foot long rectangular, concrete chute. The bottom width of the chute tapers from 133 feet on the upstream end to 70 feet on the downstream end. A slot, 20.5 feet wide by 8 inches deep, which controls the reservoir level, was constructed in the spillway control section.

No low level drain or regulated outlet works was provided for the dam.

b. Location

The David R. Wilson Dam is located on the Tenmile Creek in Shelby County, Missouri. Hagers Grove, population 32, is located 3 miles to the north of the dam and Clarence, population 1,050, is located 3 miles to the south of the dam. The dam is located in Section 32, Township 58 North, Range 12 West as shown in Missouri Atlanta, Quadrangle Sheet (15 minute series).

c. Size Classification

According to the "Recommended Guidelines for Safety Inspection of Dams", by the U.S. Department of the Army, Office of the Chief Engineer, the dam is classified in the dam size category as being "Intermediate" since its storage is less than 50,000 acre-feet but greater than 1,000 acre-feet. The dam is classified as "Small" in dam size category because its height is less than 40 feet. The overall size classification is "Intermediate" in size.

d. Hazard Classification

The dam has been classified as having "High" hazard potential by the St. Louis District Corps of Engineers on the basis that in the event of failure of the dam or its appurtenances, excessive damage could occur to downstream property, together with the possibility of the loss of life. Our findings concur with the classification. The estimated damage zone extends approximately 3.5 miles downstream of the dam. Within the possible damage zone are three dwellings, two buildings and State Highway 151 crossing.

e. Ownership

The David R. Wilson Dam is owned by Mr. David R. Wilson. The mailing address is David R. Wilson, c/o Wilson Refuse Hauling, Inc., 177C Bourke, Macon, Missouri, 63552.

f. Purpose of Dam

The main purpose of the dam is to impound water for recreational use.

g. Design and Construction History

David R. Wilson Dam was completed in 1971 by personnel under the direction of, and employed by Mr. David R. Wilson, the present owner. According to Mr. John Linton, an employee of Wilson Refuse & Hauling, the dam was under construction for about two years. In 1973 the reservoir was drained and its was necessary to rebuild the dam. Further details are not available at this time due to a lack of records and the fact that efforts to contact the owner for questioning were futile.

h. Normal Operational Procedures

Normal procedure is to allow the dam and reservoir to act entirely on its own. The spillway is an uncontrolled open chute below a broad crested weir. The dam is used to impound water for recreational use at this time. Water level below the spillway crest is controlled by rainfall, runoff and evaporation.

1.3 Pertinent Data

a. Drainage Area (square miles): 26.7

b. Discharge at Damsite

Estimated experienced maximum flood (cfs):	NA
Estimated ungated spillway capacity with reservoir at top of dam elevation (cfs):	5473

c. Elevation (feet above MSL)

Top of dam:	762.0
Spillway crest:	755.7
Normal Pool:	755.7
Maximum Pool (PMF):	766.87

d. Reservoir

Length of pool with water surface at top of dam elevation (feet):	22,000

e. Storage (Acre-Feet)

Top of dam:	26,276
Spillway crest:	17,443
Normal Pool:	17,443
Maximum Pool (PMF):	34,559

f. Reservoir Surface (Acres)

Top of dam:	1,575
Spillway crest:	1,225
Normal Pool:	1,225
Maximum Pool (PMF):	1,827

g. Dam

Type:	Earthfill
Length:	1930 feet
Structural Height:	30 feet

Hydraulic Height:	30 feet
Top width:	32 feet
Side slopes:	
Downstream	Varies from 1V to 2.75H to 1V to 1.9H
Upstream	Varies from 1V to 4H to near vertical
Zoning:	Unknown
Impervious core:	Unknown
Cutoff:	Unknown
Grout curtain:	Unknown

h. Diversion and Regulating Tunnel — None

i. Spillway

Type:	Concrete weir, uncontrolled
Length of crest:	133 feet
Crest Elevation (feet above MSL):	755.7

j. Regulating Outlets — None

SECTION 2: ENGINEERING DATA

2.1 Design

Design drawings are not available for the dam and appurtenant structures. At the time of its construction (1969 thru 1971) there was no formal design performed. The Soil Conservation Service office of Shelby County, refused to submit a design due to the extensive size of the proposed dam.

2.2 Construction

According to Mr. John Linton, an employee of Wilson Refuse and Hauling Co. the dam was built by persons directly employed by Mr. Wilson.

2.3 Operation

No operational data are available for the David R. Wilson Dam.

2.4 Evaluation

a. Availability

No design drawings, design computations, construction data, or operation data were available.

In addition, no pertinent data were available for review of hydrology, spillway capacity, flood routing through the reservoir, outlet capacity, slope stability, seepage analysis, or foundation conditions.

b. Adequacy

The lack of engineering data did not allow for a definitive review and evaluation. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing and evaluating design, operation and construction data, but is based primarily on visual inspection, past performance history, and sound engineering judgment.

Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions and made a matter of record.

c. Validity

No valid engineering data are available.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

A visual inspection of the David R. Wilson Dam was made on August 24, 1979. The following persons were present during the inspection:

Name	Affiliation	Disciplines
Dr. M.A. Samad	Engineering Consultants, Inc.	Project Engineer, Hydraulics and Hydrology
Mark R. Haynes	Engineering Consultants, Inc.	Civil, Structural and Mechanical
Dawn L. Jacoby	Engineering Consultants, Inc.	Soils
Peter L. Strauss	Engineering Consultants, Inc.	Geology
Kevin Blume	Consoer, Townsend & Assoc., Ltd.	Civil and Structural

Specific observations are discussed below.

b. Dam

The dam crest supports a small dirt road with a vegetative cover lying on either side. The crest is not protected adequately and consequently erosion is occurring. No significant deviations in vertical or horizontal alignment were apparent. Small shrinkage cracks were observed on the surface. Slight depressions and bulges were noted along the crest. There was no evidence of the dam ever being overtopped. No rodent activity was observed on the crest or the embankment.

The embankment slopes appear to be composed of a silty clay material. The uneven appearance of several areas suggest that the material was not compacted properly during construction. Uncompacted mounds of soil are still visible on the slopes. Numerous longitudinal cracks were observed along the downstream edge of the dam crest ranging in width from 1/4-inch to 12-inches and in depth from 1-inch to 3 feet. These cracks are not continuous, but when located near breaks in the slope, form classic circular failure paths. Areas of the most severe conditions are located on the steeper sections of the slopes. Typical cracks found on the embankment are shown in Picture 6, in Appendix A.

The upstream slope has no riprap protection and is experiencing severe erosion from wave action. A beach has formed next to the scarped embankment as shown in Picture 5, Appendix A.

The downstream embankment slope varies dramatically in slope and vegetative cover. Sections of the slope are covered by weeds, others by a good grass cover, and still others by large bushes and trees. Erosion is occurring in the areas not adequately protected. It appears, due to observed offsets and overgrown scarps, that several areas have experienced movement. No recent movement was observed.

No flowing seepage was observed on the embankment or downstream of the toe. A drainage ditch has been cut downstream from approximately the midsection of the dam to the right abutment. Bushes growing on the slope above this area are located on moist soil. The drainage ditch appears to have been constructed to drain a large pond of water which lies just downstream of the toe of the left half of the dam. Picture No. 15, Appendix A, was taken across the pond to the downstream embankment.

According to the "Missouri General Soil Map and Soil Association Description" published by the Soil Conservation Service, the materials in the general area of the dam belong to the soil series of Mexico-Leonard-Armstrong-Lindley in the Central Claypan Area forest. The soils are basically formed from loess and glacial till. The permeability of these soils range from slow to moderately slow. The Lindley soils generally are quite erodable and would be particularly susceptible to erosion due to overtopping.

The spillway is a cut into the left abutment which slopes upward from the crest. The right abutment has a large erosion gully cut into the downstream side, Picture No. 7, Appendix A. No signs of instability were apparent on either abutment.

c. Project Geology

The damsite is physiographically located in the Dissected Till Plains Section of the Central Lowlands Physiographic Province, according to Nevin Fenneman's "Physiography of the Eastern United States". This section is distinguished from the Young Drift section on the north and from the Till Plains on the east by the stage it has reached in the post-glacial erosion cycle. Broadly generalized, this section is a

nearly flat till plain submature to mature in its erosion cycle.

No faults have been identified in the vicinity of the dam.

Some minor folding has been identified in Shelby County. The closest trace of a fold to the damsite is about eight miles to the southwest where the end of the trace of the Macon-Sullivan Trough is found. The Macon-Sullivan Trough had its last movement in post-Ordovician. This minor structure has no effect on the dam.

The site bedrock geology, beneath the drift, as shown on the Geologic Map of Missouri, (1979), is interbedded Pennsylvanian age shales, limestones, sandstones. These strata generally strike north-south and dip gently to the west.

No bedrock was seen at or in the vicinity of the damsite. The entire area is mantled by glacial drift.

d. Appurtenant Structures

(1) Spillway

The spillway weir appeared to be in a stable condition. No spalling or cracking of the concrete was observed. Reinforcement is projecting out of the concrete at the top of the downstream end of the weir. The reinforcement appears to be vertical reinforcement which was not cut off below the top of the concrete. The slot constructed in the spillway has five 8-inch I beams placed parallel to the weir which creates six openings in the spillway. A concrete slab spans between the beams creating a bridge. One of the openings was partially clogged by debris and concrete from the slab which has collapsed. Some wet areas were observed in the discharge chute at the base of the spillway weir. No flowing

seepage was observed. The spillway and discharge chute were not obstructed.

The overall condition of the slab and right retaining wall of the discharge chute was good. There was no spalling of the concrete, but a few temperature cracks were observed. The right retaining wall appeared to be stable. The face of the retaining wall was not properly finished and formwork ties were still projecting from the concrete. Minor chemical leaching was observed on the wall.

A portion of the left retaining wall appears to have collapsed at some time and the collapsed portion was reconstructed. A large bulge was observed on the reconstructed portion of the wall, which appears to have been due to formwork failure. Some formwork was observed between the contact of the new and old portion of the wall. Some dental work was performed in one area using concrete block and mortar. Reinforcement was projecting from the remains of the collapsed portion of the wall. Two large diagonal temperature cracks were observed on the wingwall at the downstream end of the chute, however, the wall appeared to be stable. The entire left retaining wall appeared to be stable and in good condition, but the method of construction used for the wall was less than desirable.

The downstream end of the discharge chute drops 7 feet vertically onto a concrete apron. The apron appears to have been constructed of waste concrete which was dumped there. No undermining of the apron was observed.

Slopes above the discharge chute were exhibiting evidence of severe erosion due to storm runoff.

(2) Outlet Works

There is no regulated outlet pipe or low level drain at the dam.

e. Reservoir Area

The water surface elevation was 754.7 feet above M.S.L. on the day of the inspection.

The slopes along the reservoir rim are gently sloped with a good grass cover. The rim has undergone some erosion due to wave action. No evidence of instability or severe erosion of the slopes was readily apparent.

f. Downstream Channel

The downstream channel is a 40 feet wide and 20 feet deep, earth cut, open channel, having side slopes approximately 1V to 0.5H. The side slopes of the channel have undergone severe erosion due to storm runoff and discharges through the spillway. The slopes appear to be very unstable. The channel is unobstructed.

3.2 Evaluation

The visual inspection revealed some items which indicate serious instability and potential for failure of the dam embankment. Immediate action should be undertaken to correct the instability problems with the dam. The conditions indicating instability are as as follows:

1. The unstable condition of the downstream slope of the embankment as indicated by the following:

(a) Cracks along the crest of the slope.

(b) Visible scarps due to past slides.

(c) Erosion in unprotected areas.

(d) Areas of uncompacted fill.

The following conditions were observed which could affect the safety of the dam or which will require maintenance within a reasonable period of time.

1. The conditions observed on the upstream slope of the embankment:

   (a) Beach and scarp caused by wave action.

   (b) Erosion gullies on the slope above the sloughing.

   (c) No riprap protection.

2. The standing water observed near the toe.

3. The erosion gully observed on the right abutment.

4. The instability and erosion in the downstream channel.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

David R. Wilson Dam is used to impound water for recreational use. Normal procedure is to allow the water level to remain as high as possible.

4.2 Maintenance of Dam

The dam and appurtenant structures are maintained by the owner, Mr. David R. Wilson and his employees.

The dam was, at the time of this inspection, in a state of deterioration. The downstream slope was mostly covered with trees and dense vegetation. There was extensive wave erosion present on the upstream slope and multiple transverse cracks near the contact of the downstream slope and dam crest. Many areas of spalling, cracking and exposed reinforcement were observed in the spillway.

4.3 Maintenance of Operating Facilities

There are no operable facilities connected with the dam which require any maintenance.

4.4 Description of Any Warning System in Effect

The inspection team is not aware of any existing warning system in effect.

4.5 Evaluation

The operation and maintenance of the dam is lacking. To improve the operational adequacy of the dam, the corrective measures outlined in Section 7.2 should be undertaken as recommended.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design

The watershed area of the David R. Wilson Dam upstream from the dam axis consists of approximately 26.7 square miles. The watershed area is mostly pasture and range land. Land gradients in the higher regions of the watershed average roughly 2 percent, and in the lower areas surrounding the reservoir average about 4 percent. The David R. Wilson Dam Reservoir is located on the Tenmile Creek, which joins North Fork of the Salt River approximately 4-1/2 miles downstream from the dam. At its longest arm the watershed is approximately 3 miles long. A drainage map showing the watershed is presented as Plate 1 in Appendix B.

Evaluation of the hydraulic and hydrologic features of David R. Wilson Dam was based on criteria set forth in the Corps of Engineers' "Recommended Guidelines for Safety Inspection of Dams", and additional guidance provided by the St. Louis District of the Corps of Engineers. The Probable Maximum Flood (PMF) was calculated from the Probable Maximum Precipitation (PMP) using the methods outlined in the U.S. Weather Bureau Publication, Hydrometeorological Report No. 33. The probable maximum storm duration was set at 24 hours, and storm rainfall distribution was based on criteria given in the Corps of Engineers' EM 1110-2-1411 (Standard Project Storm). The Soil Conservation Service (SCS) method was used for deriving the unit hydrograph, utilizing the Corps of Engineers' computer program HEC-1 (Dam Safety Version). The unit

hydrograph parameters are presented in Appendix B. The SCS method was also used for determining the loss rate. The hydrologic soil group of the watershed was determined by use of published soil maps. The hydrologic soil group of the watershed and the SCS curve number are presented in Appendix B. The curve number, the unit hydrograph parameters, the PMP index rainfall and the percentages for various durations were directly input to the HEC-1 (Dam Safety Version) computer program to obtain the PMF hydrograph. The computed peak inflow of the PMF and one-half of the PMF are 108,696 cfs and 54,348 cfs, respectively.

Both the PMF and one-half of the PMF inflow hydrographs were routed through the reservoir by the Modified Puls Method also utilizing the HEC-1 (Dam Safety Version) computer program. The reservoir was assumed at the spillway crest level at the start of the routing computation. The peak outflow discharges for the PMF and one-half of the PMF are 68,022 and 22,165 cfs, respectively. Both the PMF and one-half of the PMF when routed through the reservoir resulted in overtopping of the dam.

The size of physical features utilized to develop the stage-outflow relation for the spillways and overtopping of the dam were determined from field notes, and sketches, prepared during the field inspection. The reservoir stage-capacity data were based on the U.S.G.S. Missouri Atlanta, Quadrangle topographic map (15 minute series). The spillway and dam overtop rating curve and the reservoir capacity curve are presented in Plates 2 & 3, respectively, in Appendix B.

From the standpoint of dam safety, the hydrologic design of a dam must aim at avoiding overtopping. Overtopping is especially dangerous for an earth dam because of its erosive characteristics. The safe hydrologic design of an embankment dam requires a spillway discharge capability, in

combination with an embankment crest height that can handle a very large and exceedingly rare flood without dam overtopping.

The Corps of Engineers design dams to safely pass the Probable Maximum Flood that is estimated could be generated from the dam's watershed. This is the generally accepted criterion for major dams throughout the world, and is the standard for dam safety where overtopping would pose any threat to human life. Accordingly, the hydrologic requirement for safety for this dam is the capability to pass the Probable Maximum Flood without overtopping.

b. Experience Data

It is believed that records of reservoir stage or spillway discharge are not maintained for this site.

c. Visual Observations

Observations made of the spillway during the visual inspection are discussed in Section 3.1.c(1) and evaluated in Section 3.2.

d. Overtopping Potential

As indicated in Section 5.1.a, both the Probable Maximum Flood and one-half of the Probable Maximum Flood, when routed through the reservoir, resulted in overtopping of the dam. The peak outflow discharges for the PMF and one-half of the PMF are 68,022 and 22,165 cfs, respectively. The PMF overtopped the dam crest by 4.87 feet and one-half of the PMF overtopped the dam crest by 1.93 feet. The total duration of embankment overflow is 13 hours during the PMF, and 9 hours during one-half of the PMF. The spillway/reservoir system of David R. Wilson Dam is capable of accommodating a flood equal to approximately 27 percent of the PMF before overtopping the

dam. The spillway/reservoir system of David R. Wilson Dam will accommodate the 100-year flood without overtopping.

The failure of the dam could cause extensive damage to the property downstream of the dam and possible loss of life. The estimated damage zone extends approximately 3-1/2 miles downstream of the dam. Within the damage zone are three dwellings, two buildings and State Highway 151 crossing.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Visual observations indicate serious instability and potential for failure of the embankment slopes. Cracks up to 3 feet deep were observed. The slopes should be cleared, steeper areas flattened, and then recompacted. Erosion on the upstream face should be checked by placing adequate riprap on the slope. Adequate grass cover should be provided for the embankment slopes. Possible seepage areas should be investigated. The erosion gully observed downstream of the dam on the right abutment contact does not affect the stability of the embankment. Nevertheless, if the erosion is allowed to continue, it could encroach upon the toe of the embankment. In the absence of seepage and stability analyses, no quantative evaluation of the structural stability can be made.

There were no signs of structural instability in the spillway or discharge channel. The structural stability of the downstream channel appears to be in jeopardy due to the erosion and steepening of the slopes.

b. Design and Construction Data

No design computations were uncovered during the report preparation phase. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available. No embankment or foundation soil parameters were available for carrying out a conventional stability analysis on the embankment. No

construction data or specifications relating to the degree of embankment compaction were available for use in a stability analysis.

c. Operating Records

No regulated outlet works was provided for the David R. Wilson Dam. The water level on the day of the inspection was 4 inches below the crest of the slot in the spillway, and it is assumed that the reservoir remains close to full at all times.

d. Post Construction Changes

No post construction changes are known to exist which will affect the structural stability of the dam.

e. Seismic Stability

The dam is located in Seismic Zone 1, as defined in "Recommended Guidelines For Safety Inspection of Dams" as prepared by the Corps of Engineers, and therefore, does not require a seismic stability analysis, provided static stability conditions are satisfactory and conventional safety margins exist.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation, however, the investigation is intended to identify any need for such studies.

It should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is also important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be assurance that a future unsafe condition could be detected.

a. Safety

The spillway capacity of David R. Wilson Dam was found to be "Seriously Inadequate". The spillway/reservoir system will accommodate only 27 percent of the PMF without overtopping the dam. The surface soils on the dam are quite silty and very susceptible to erosion if the dam is overtopped. The dam is overtopped by about 5 feet during the PMF and the duration of embankment overflow is 13 hours. If the material in the dam is silty soil, the dam would be susceptible to erosion and possible failure during overtopping.

The overall safety of the dam embankment appears to be in jeopardy. The current instability of the downstream slope is serious and may cause failure of this embankment. It is recommended that remedial measures should be undertaken immediately. The erosion of the upstream slope due to wave action and surface runoff should be repaired and the slope protected by riprap and grass. The erosion on the right abutment contact should be repaired and protected from surface runoff. No quantative evaluation of the safety of the embankment can be made in view of the absence of seepage and stability analyses. No evidence of the dam ever being overtopped was observed.

The origin of the standing water observed at the toe was probably local surface runoff, seepage, or a combination of both. No flowing seepage was observed. The water does not appear to affect the safety of the dam in its present condition.

The erosion and instability of the slopes observed in the downstream channel does not appear to affect the safety of the dam. Nevertheless, the condition should be monitored and corrective measures should be undertaken as required.

b. Adequacy of Information

Pertinent information relating to the design of the dam and appurtenant structures is completely lacking. The conclusions presented in this report are based on field measurements, past performance and the present condition of the dam. Information on the design hydrology, hydraulic design, and the operation and maintenance of the dam, as well as seepage and stability analyses were not available for review. Lack of seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" is considered a deficiency.

c. Urgency

The instability of the downstream slope requires immediate remedial work as recommended in Section 7.2b(1). The remaining remedial measures recommended in Section 7.2 should be accomplished within a reasonable period of time.

d. Necessity for Phase II Inspection

Based on results of the Phase I inspection, and if the remedial measures described in Paragraph 7.2 are undertaken, a Phase II inspection is not felt to be necessary.

7.2 Remedial Measures

a. Alternatives

Spillway capacity and/or height of dam should be increased to accomodate the PMF without overtopping the dam.

b. O & M Procedures

1. The following corrective measures should be undertaken immediately:

   (a) The downstream slope should be repaired as follows:

      (1) Clear all trees and vegetation from the slope. Removal of large trees should be under the guidance of an engineer experienced in the design and construction of earthen dams. Indiscriminate clearing could jeopardize the safety of the dam.

(2) Rework the slope by regrading, recompacting and flattening the steeper sections.

(3) Adequately protect the slope from surface erosion.

2. The following corrective measures should be undertaken within a reasonable period of time:

(a) The erosion and sloughing of the upstream slope should be repaired and the slope adequately protected against wave action and surface runoff by riprap and grass.

(b) Repair the erosion gully on the right abutment and protect from further damage.

(c) Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of earthen dams.

3. The following conditions should be monitored:

(a) The standing water located at the toe should be investigated to determine the source. Necessary remedial measures should be undertaken as required.

(b) The erosion in the downstream channel should be monitored and necessary repairs made as required.

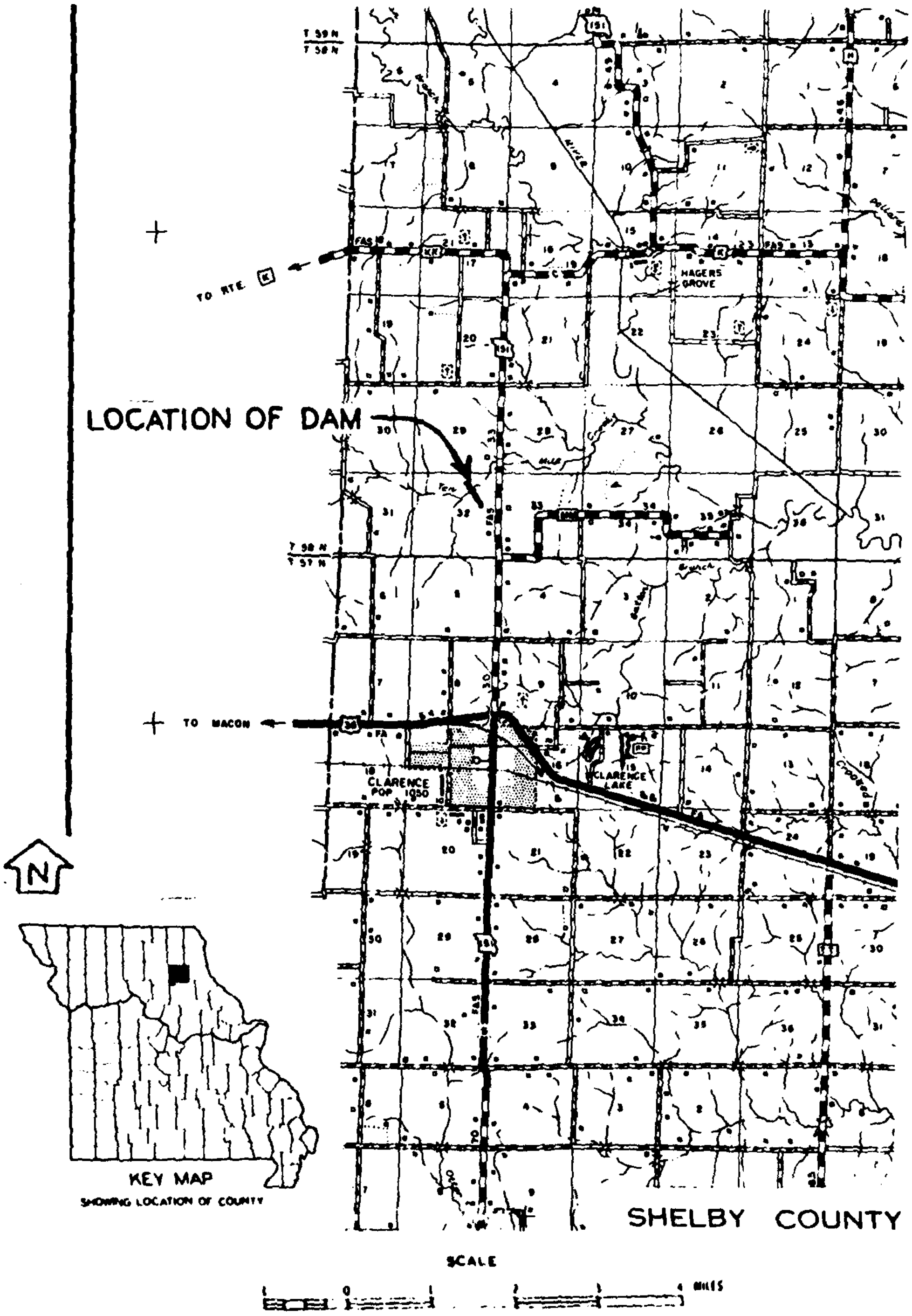
4. The owner should initiate the following programs:

   (a) Periodic inspection of the dam by a professional engineer experienced in the design and construction of earthen dams.

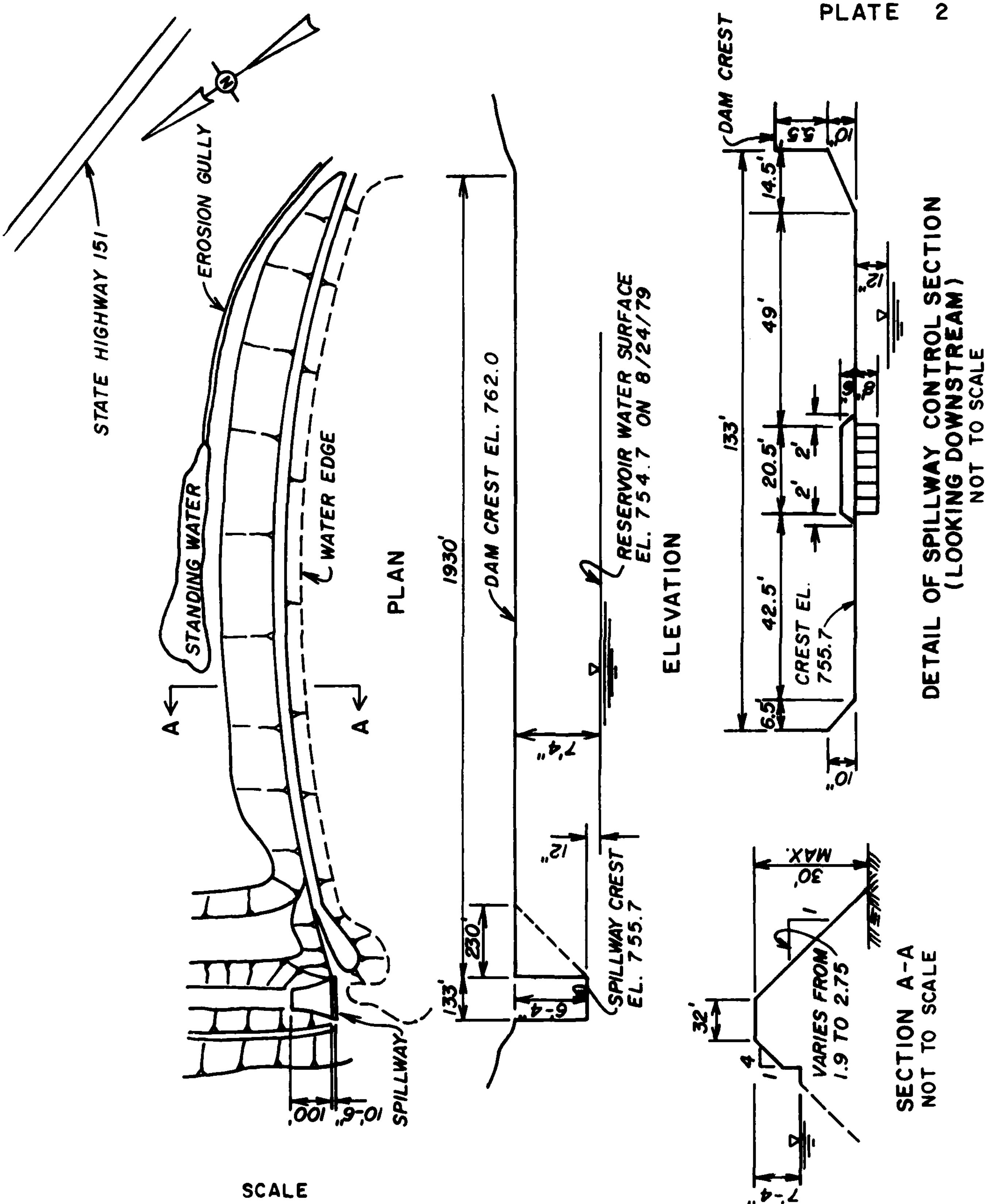
   (b) Set up a maintenance schedule and log all visits to the dam for operation, repairs and maintenance.

PLATES

PLATE-1



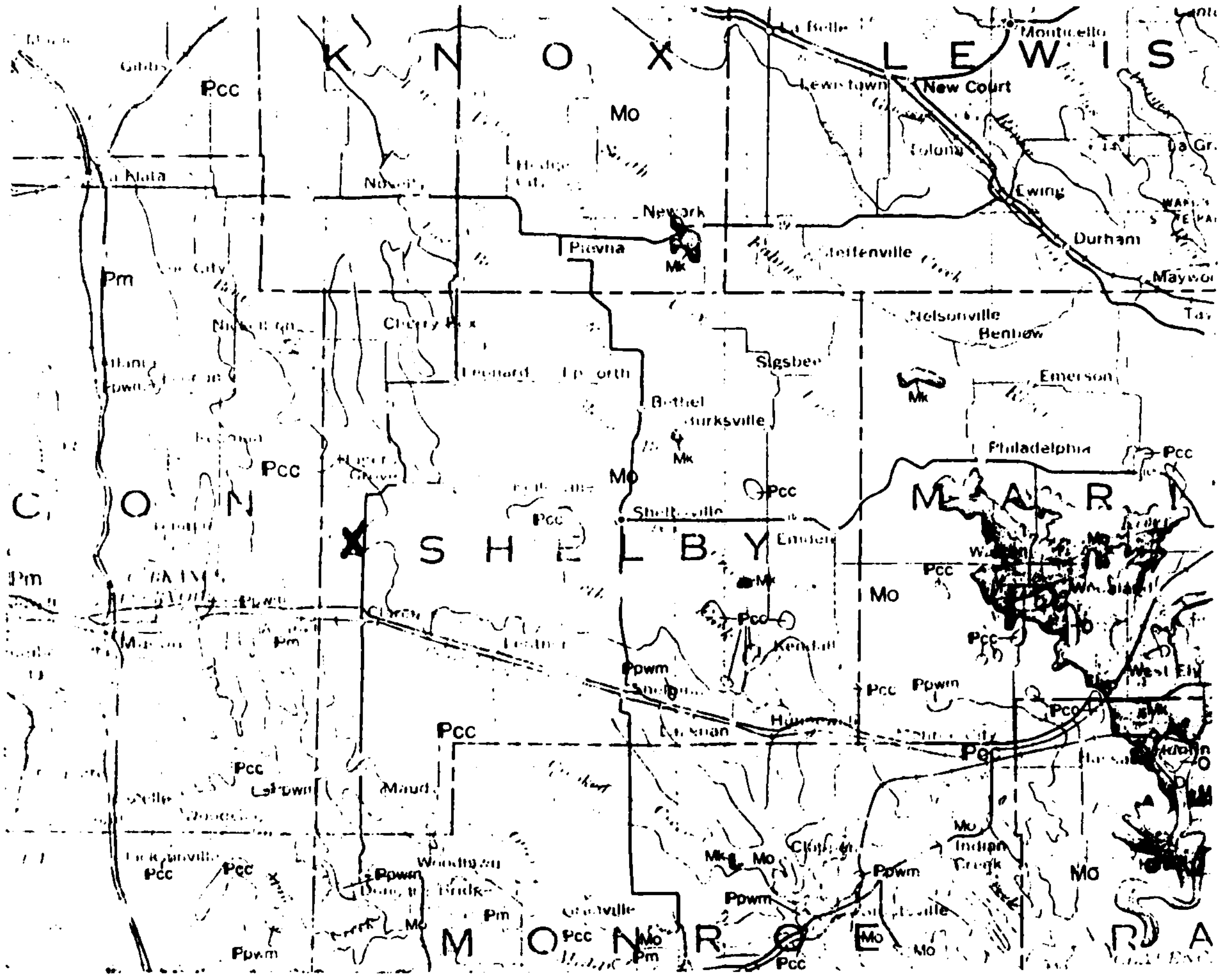
LOCATION MAP - DAVID R. WILSON DAM



SCALE
1"=300' (HORIZONTAL)
VERTICAL (NOT TO SCALE)

DAVID R. WILSON DAM (MO. 10242)
PLAN, ELEVATION & SECTION

PLATE-3



PENNSYLVANIAN:
- IPm - MARMATON GROUP
- IPcc - CHEROKEE GROUP, CABANISS SUBGROUP

MISSISSIPPIAN: MO - OSAGEAN SERIES

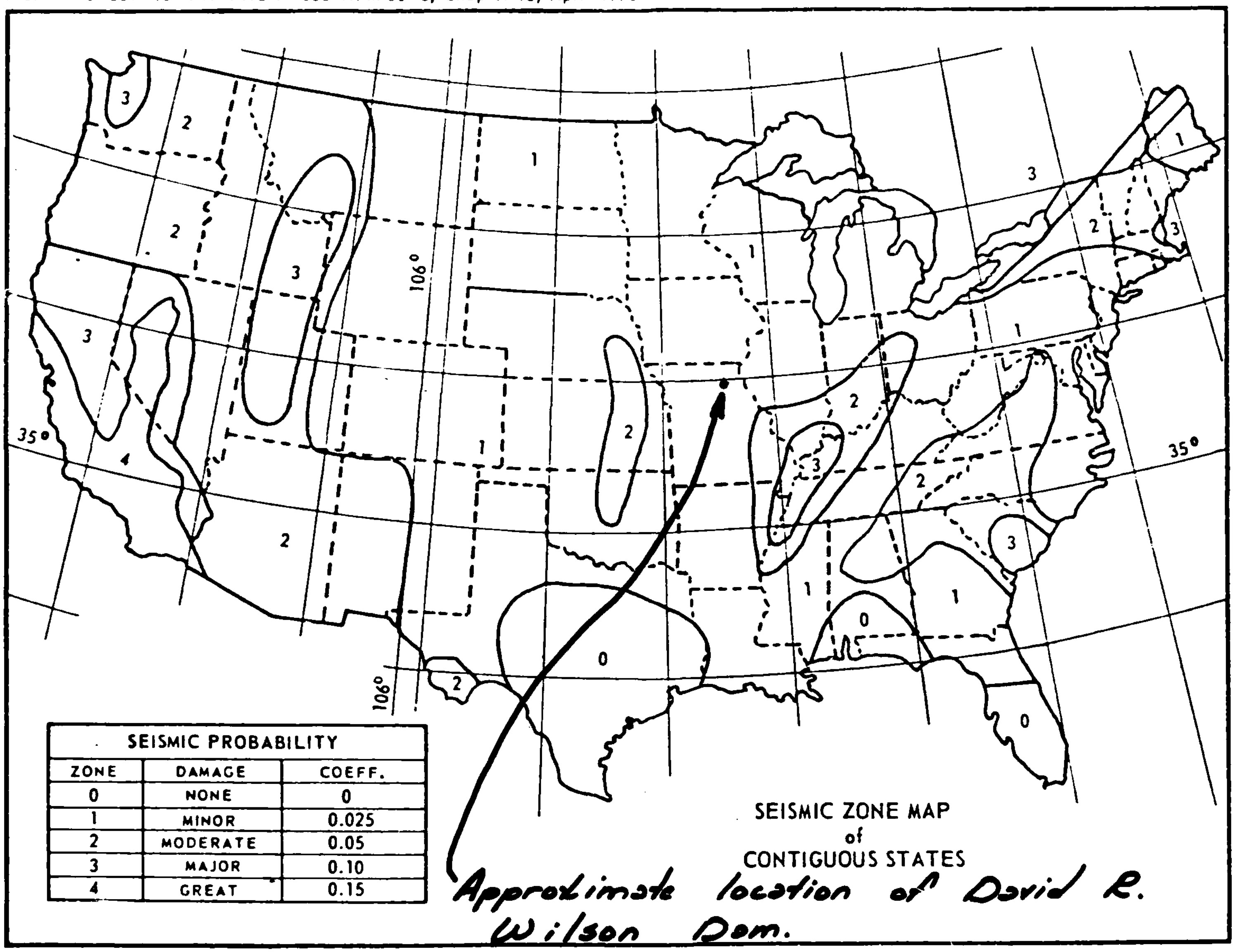
X - LOCATION OF DAM, MO. 10242

REFERENCE:
GEOLOGIC MAP OF MISSOURI
MISSOURI GEOLOGIC SURVEY
1979

GEOLOGIC MAP OF SHELBY COUNTY AND ADJACENT AREA

PLATE-4

From TM 5-809-10 NAVFAC P-355 AFM 88-3, Chapter 13; April 1973



SEISMIC PROBABILITY		
ZONE	DAMAGE	COEFF.
0	NONE	0
1	MINOR	0.025
2	MODERATE	0.05
3	MAJOR	0.10
4	GREAT	0.15

SEISMIC ZONE MAP
of
CONTIGUOUS STATES

Approximate location of David R. Wilson Dam.

APPENDIX A

PHOTOGRAPHS TAKEN DURING INSPECTION

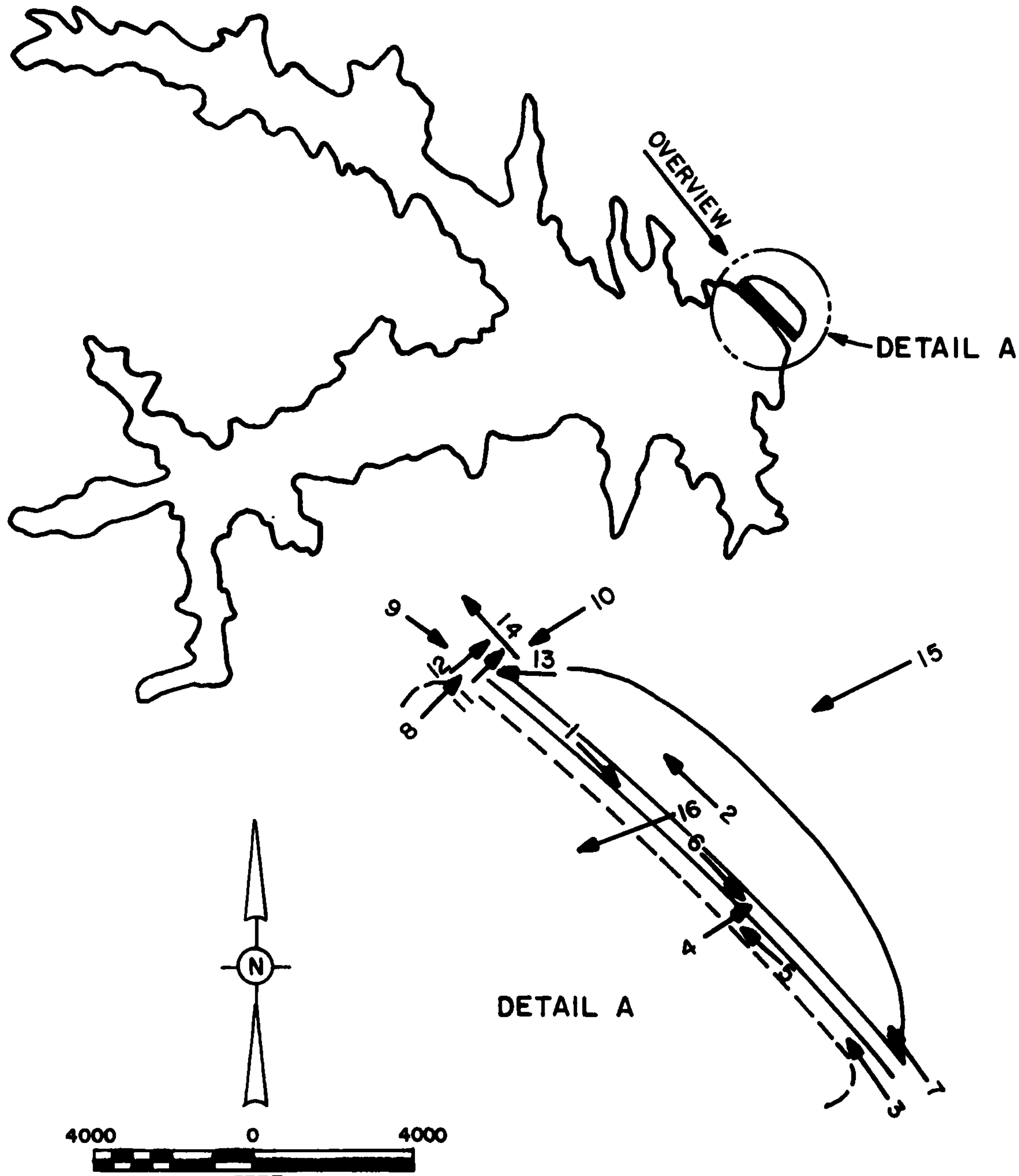


PHOTO INDEX
FOR
DAVID R. WILSON DAM

David R. Wilson Dam

Photo 1.	-	View of the crest.
Photo 2.	-	View of the downstream slope of the embankment.
Photo 3.	-	View of the upstream slope of the embankment.
Photo 4.	-	View of an erosion gully on the upper portion of the upstream slope.
Photo 5.	-	Closeup of the beach and scarp on the upstream slope.
Photo 6.	-	View of tension cracks on the crest of the downstream slope.
Photo 7.	-	View of the erosion gully on the right abutment.
Photo 8.	-	View of the spillway from upstream.
Photo 9.	-	View of the spillway from the left abutment.
Photo 10.	-	View of the spillway and discharge channel from downstream.
Photo 11.	-	View of the downstream channel.
Photo 12.	-	View of the left retaining wall of the discharge channel. Note poor construction.
Photo 13.	-	View of the slot constructed into the spillway.
Photo 14.	-	Closeup view of the left retaining wall of the discharge channel. Note the formwork, reinforcement, portion of original wall and dental work.

Photo 15.	-	View of standing water just downstream of the dam.
Photo 16.	-	View of the reservoir rim.

David R. Wilson Dam

Photo 1

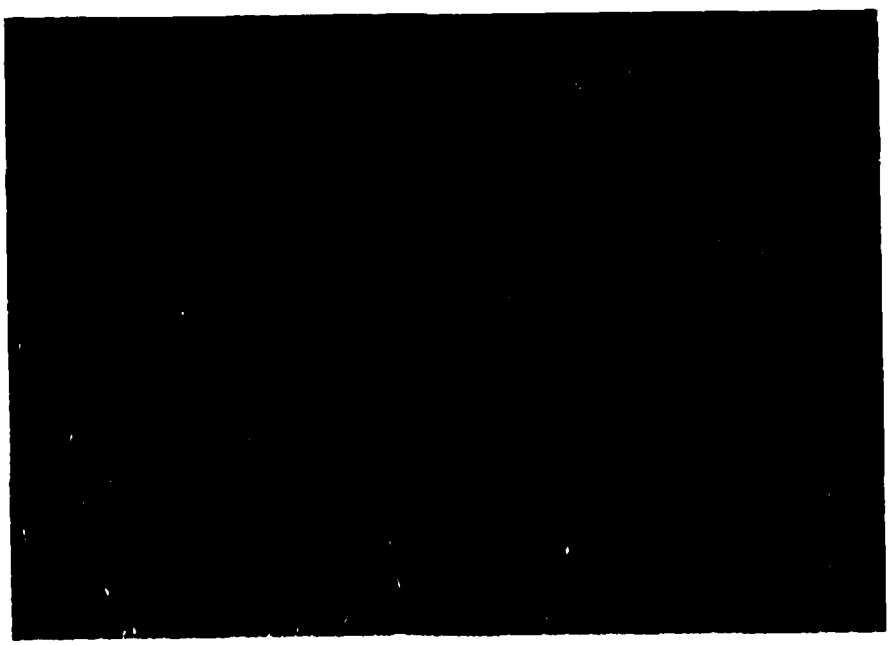


Photo 2

David R. Wilson Dam

Photo 3

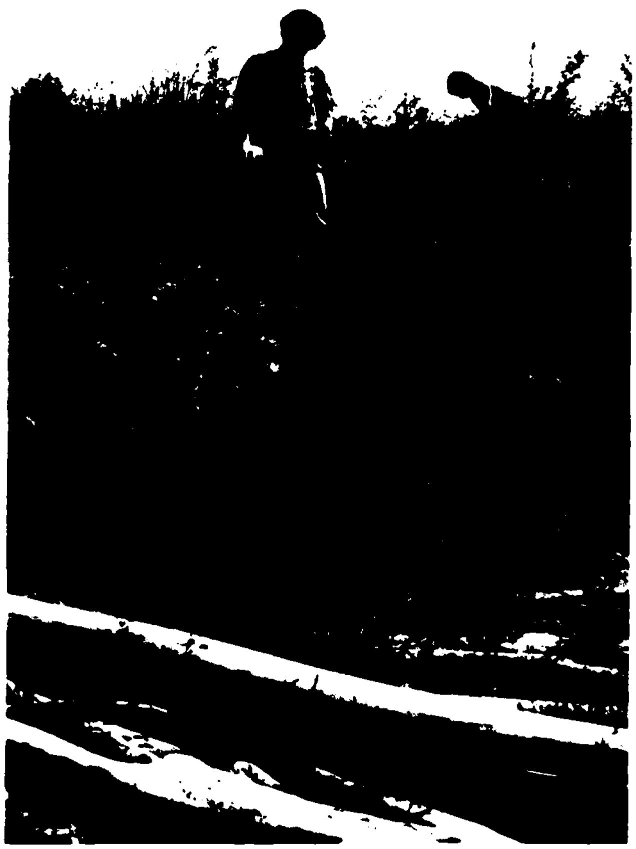


Photo 4

Photo 5

Photo 6

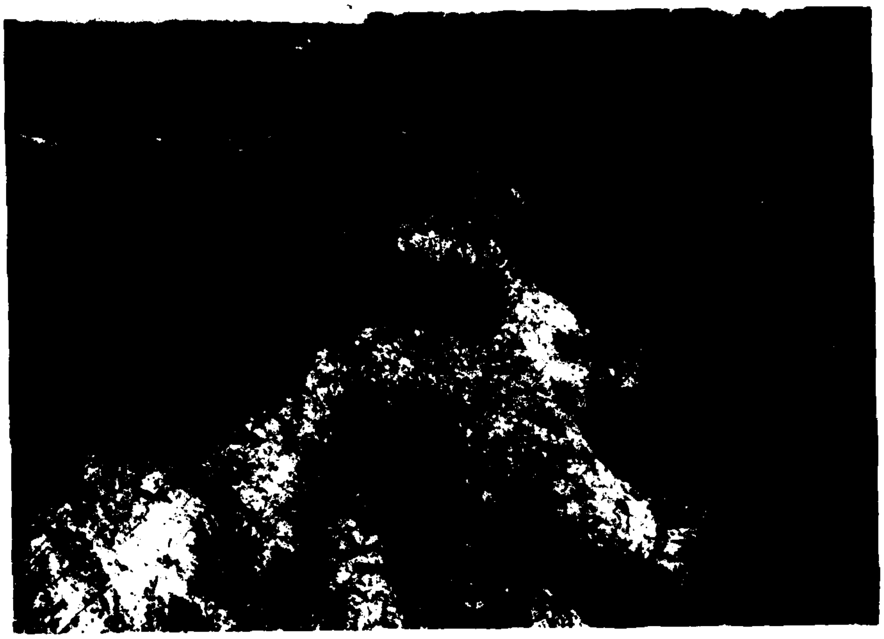


Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

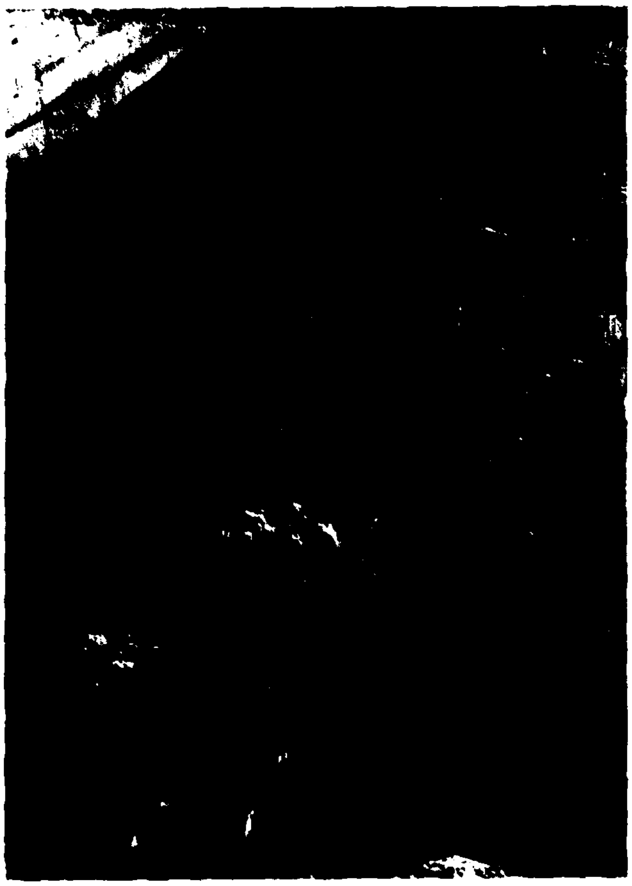


Photo 14

Photo 15

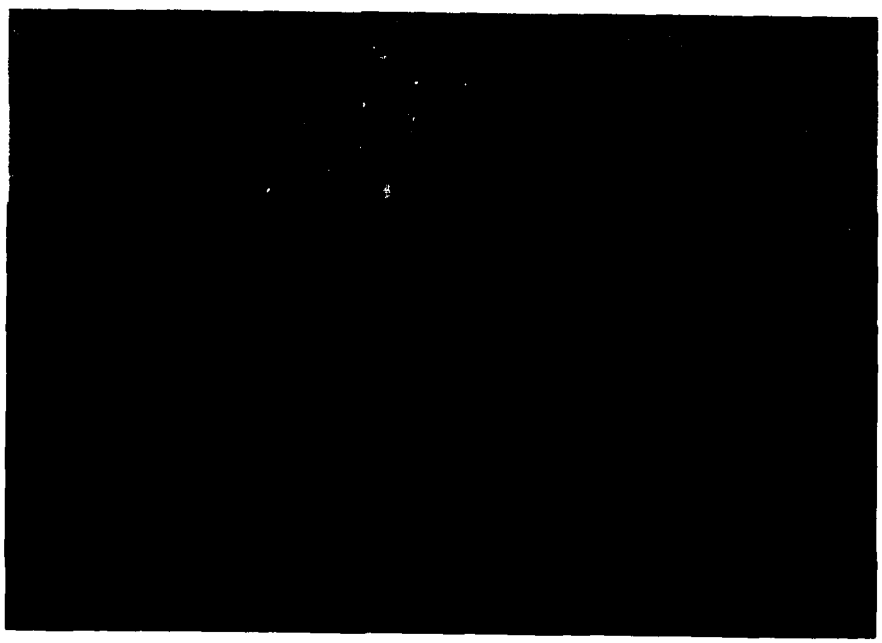
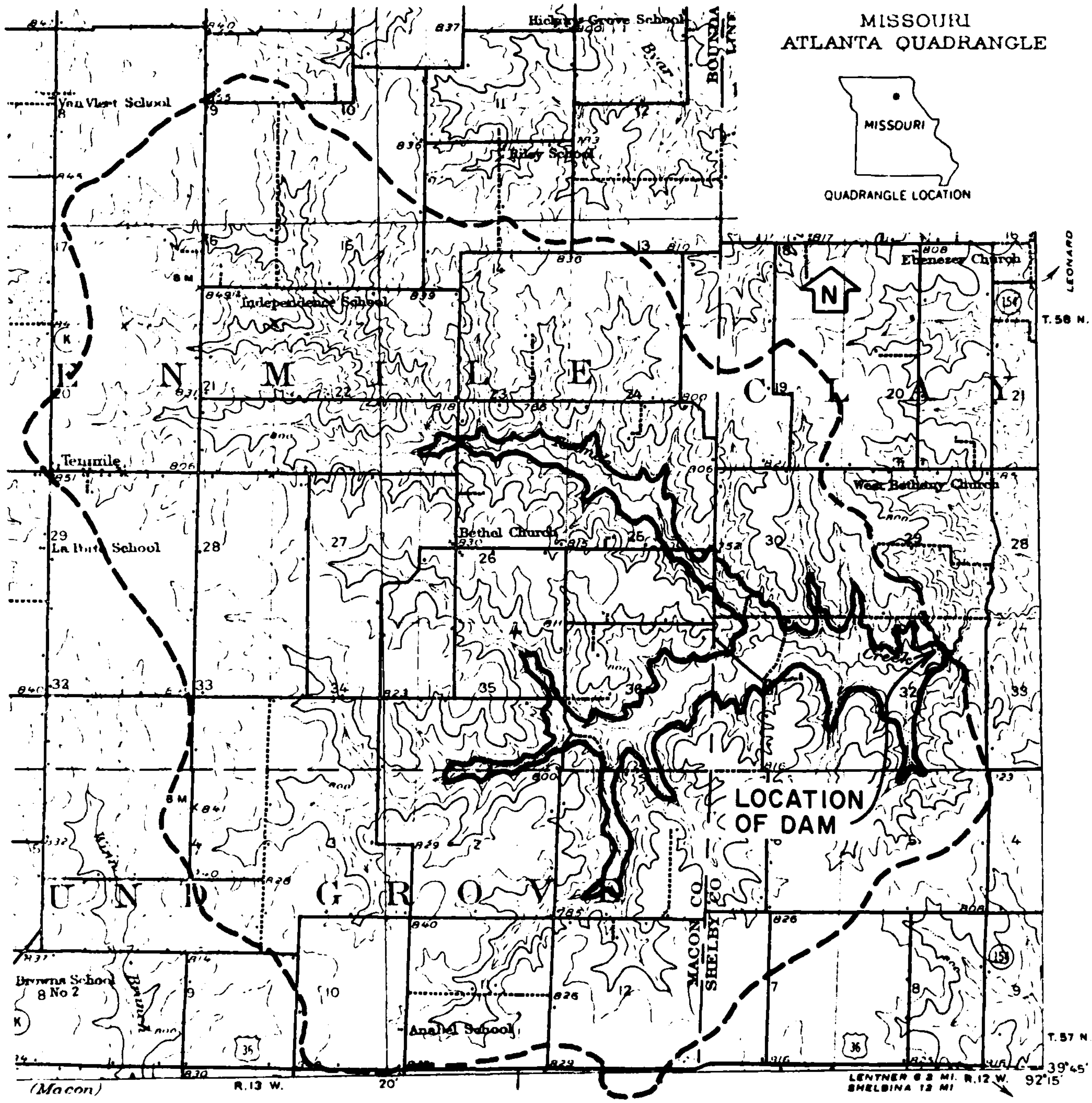


Photo 16

APPENDIX B

HYDROLOGIC COMPUTATIONS

PLATE I, APPENDIX B



SCALE 1:62500

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

DRAINAGE BOUNDARY– – – – – –

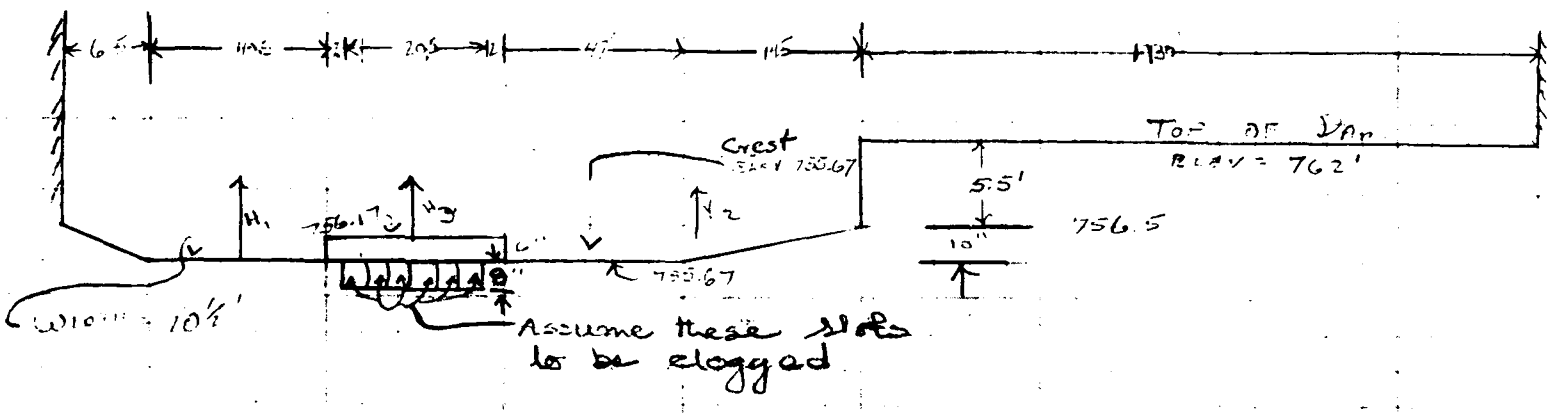
DAVID R. WILSON DAM (MO. 10242)
DRAINAGE BASIN

PRC ENGINEERING CONSULTANTS, INC.

Dam Safety Inspection - Missouri — SHEET NO. 1 OF ___

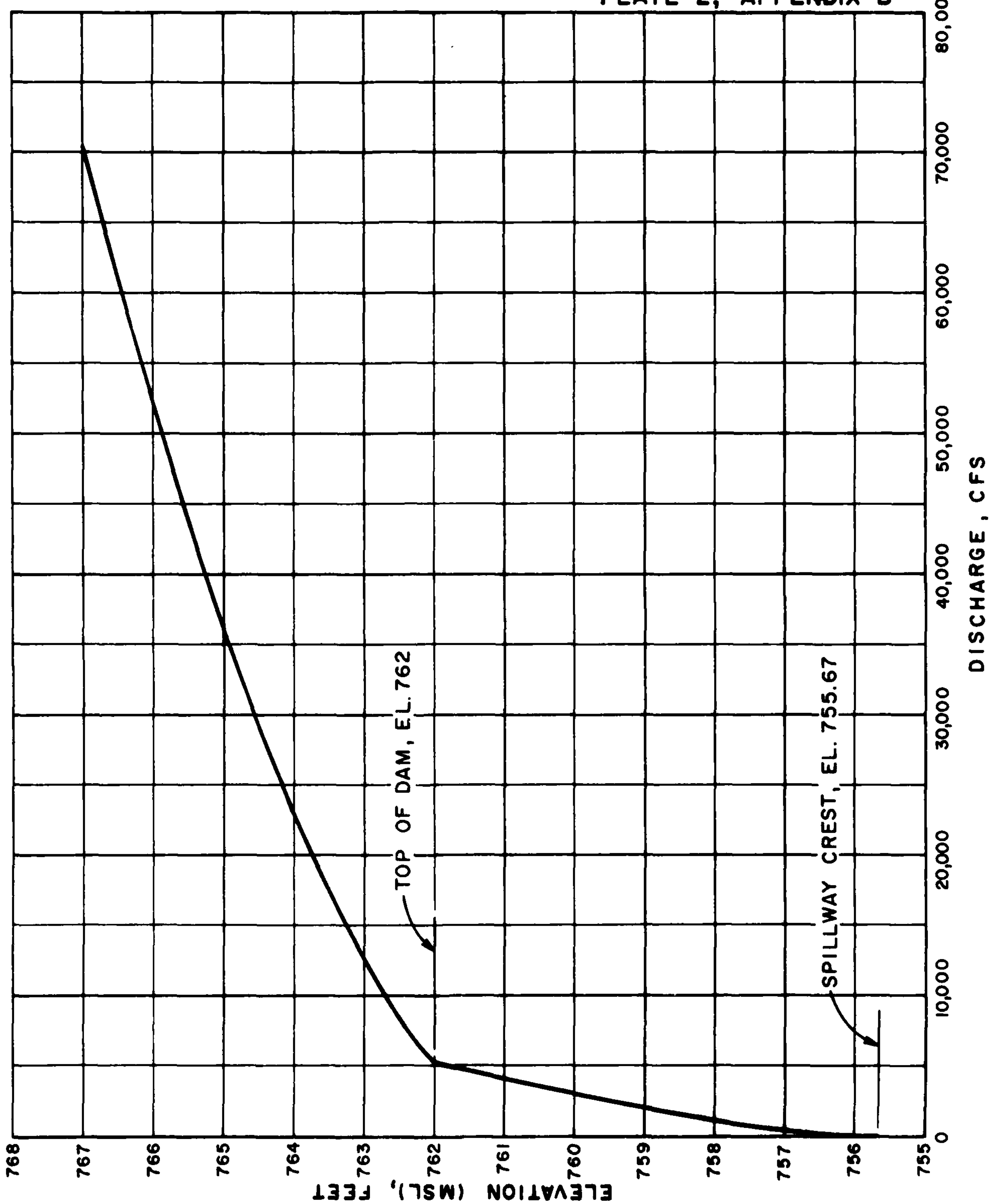
Davis R. Wilson Dam (10242) — JOB NO. 1240

Spillway And Overtop Rating — BY R. — DATE 9-[illegible]



U.S. W.S.	C_1	L_1	H_1	$Q_1 = C_1L_1H_1^{3/2}$	$Y_{c_1} = 2/3\,(US-755.67)$	T_{c_2}	A_{c_2}	$V_{c_2} = 5.67\sqrt{A_{c_2}/T_{c_2}}$	$Q_{c_2} = A_{c_2} \cdot V_{c_2}$	C_3	L_3	H_3	$Q_3 = C_3L_3H_3^{3/2}$	C_4	L_4	H_4	$Q_4 = C_4L_4H_4^{3/2}$	
755				0														0
755.67		87.5																0
756.00	2.52		0.33	41.8	0.22	5.56	0.61	1.88	1.15									42.95
757.50	2.69		0.83	178	0.55	13.98	3.84	2.97	11.4	2.52	24.5	.33	52.7					242.3
758.00	2.64		2.33	822	1.55	21	23.84	6.04	144	2.64		1.83	160					1126
760			4.33	2081	2.83	21	51.94	8.92	463			3.83	485					3029
762			6.33	3679	4.22	21	79.91	11.06	884			5.83	710			0		5473
764			8.33	5554	5.55	21	107.91	12.85	1387			7.83	1117	2.64	1930	2	14411	22469
[illegible]			10.33	7669	6.89	21	135.94	14.43	1961			7.83	1793			4	40761	52184
76[illegible]			11.33	8810	7.55	21	149.84	15.15	2270			10.83	2305			5	5[illegible]	70351

PLATE 2, APPENDIX B



DAVID R. WILSON DAM (MO. 10242)
SPILLWAY AND OVERTOP RATING CURVE

ECI-4 **PRC ENGINEERING CONSULTANTS, INC.**

Dam Safety Inspection — SHEET NO. 1 OF ___

David R. Wilson Dam Mo 10242 — JOB NO. 1240

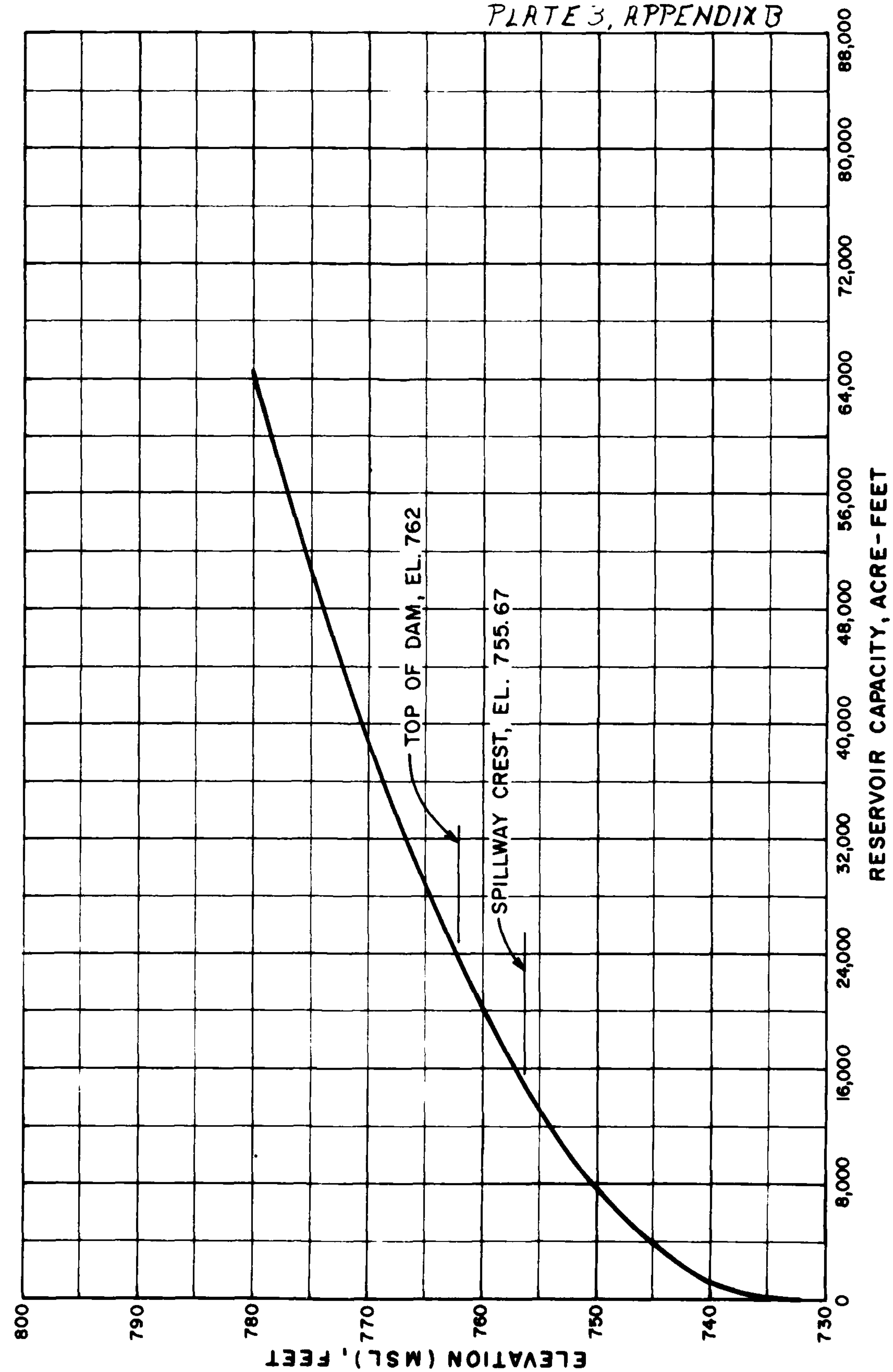
Reservoir Area Capacity — BY PRW DATE 2-27

DAVID R. WILSON DAM

RESERVOIR AREA CAPACITY

ELEV MSL (ft.)	RESERVOIR SURFACE AREA (ACRES	INCREMENTAL VOLUME (AC-ft)	TOTAL VOLUME (AC-ft)	REMARKS
732	0	0	0	EST. STREAMBED AT DAM SITE
740	505	1347	1347	
755.67	1225	13145	14492	SPILLWAY CREST
760	1458	5801	20293	
762	1575	3032	23325	TOP OF DAM
780	3126	41519	64844	

PLATE 3, APPENDIX B



DAVID R. WILSON DAM (MO. 10242)
RESERVOIR CAPACITY CURVE

PRC ENGINEERING CONSULTANTS, INC.

DAM SAFETY INSPECTION - MISSOURI SHEET NO. 1 OF
DAVID R WILSON DAM (10242) JOB NO. 1240-001-1
PROBABLE MAXIMUM PRECIPITATION BY KLB DATE 8-2?

DAVID R WILSON DAM (10242)

DETERMINATION OF PMP

1) DETERMINE AREA OF DRAINAGE BASIN

D.A. = 17114 AC = 26.7 SQ. MI.

2) DETERMINE PMP INDEX RAINFALL
(200 SQ. MI., 24 HR. DURATION)

LOCATION OF CENTEROID OF BASIN

LONGITUDE = 92° 19' 00"

LATITUDE = 39° 47' 34"

⇒ ZONE 7, PMP INDEX = 24.3"

3) DETERMINE BASIN RAINFALL IN TERMS OF PERCENTAGE OF PMP INDEX RAINFALL FOR VARIOUS DURATIONS:

LOCATION: LONGITUDE 92° 19' 00"

LATITUDE 39° 47' 34"

DURATION (HR)	PERCENT OF INDEX RAINFALL %	TOTAL RAINFALL (IN)	RAINFALL INCREMENTS (IN)	DURATION OF INCREMENTS
6	92.2	22.4	22.4	6
12	110.8	26.9	4.5	6
24	120.4	29.3	2.4	12

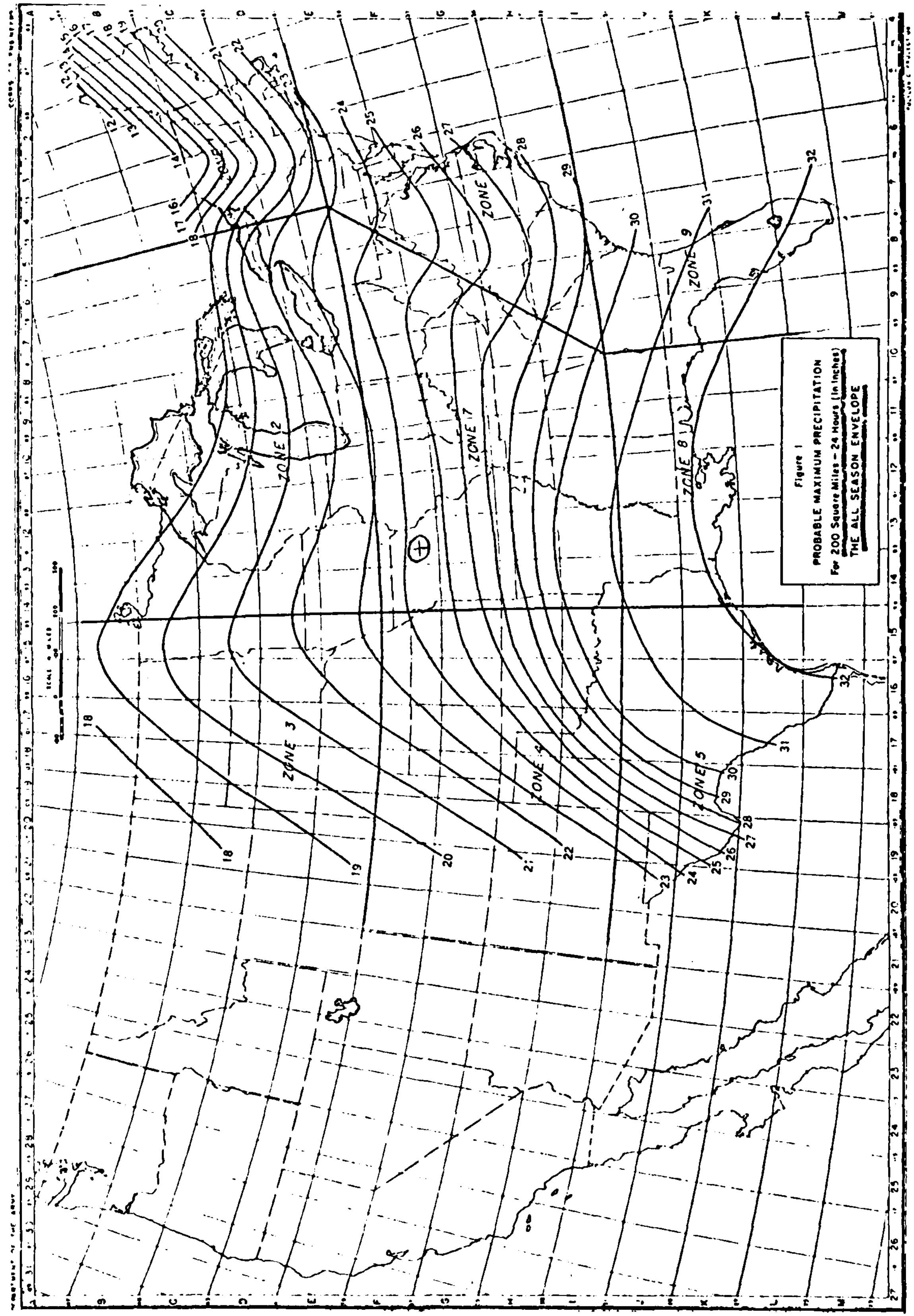


Figure 1
PROBABLE MAXIMUM PRECIPITATION
For 200 Square Miles – 24 Hours (In Inches)
THE ALL SEASON ENVELOPE

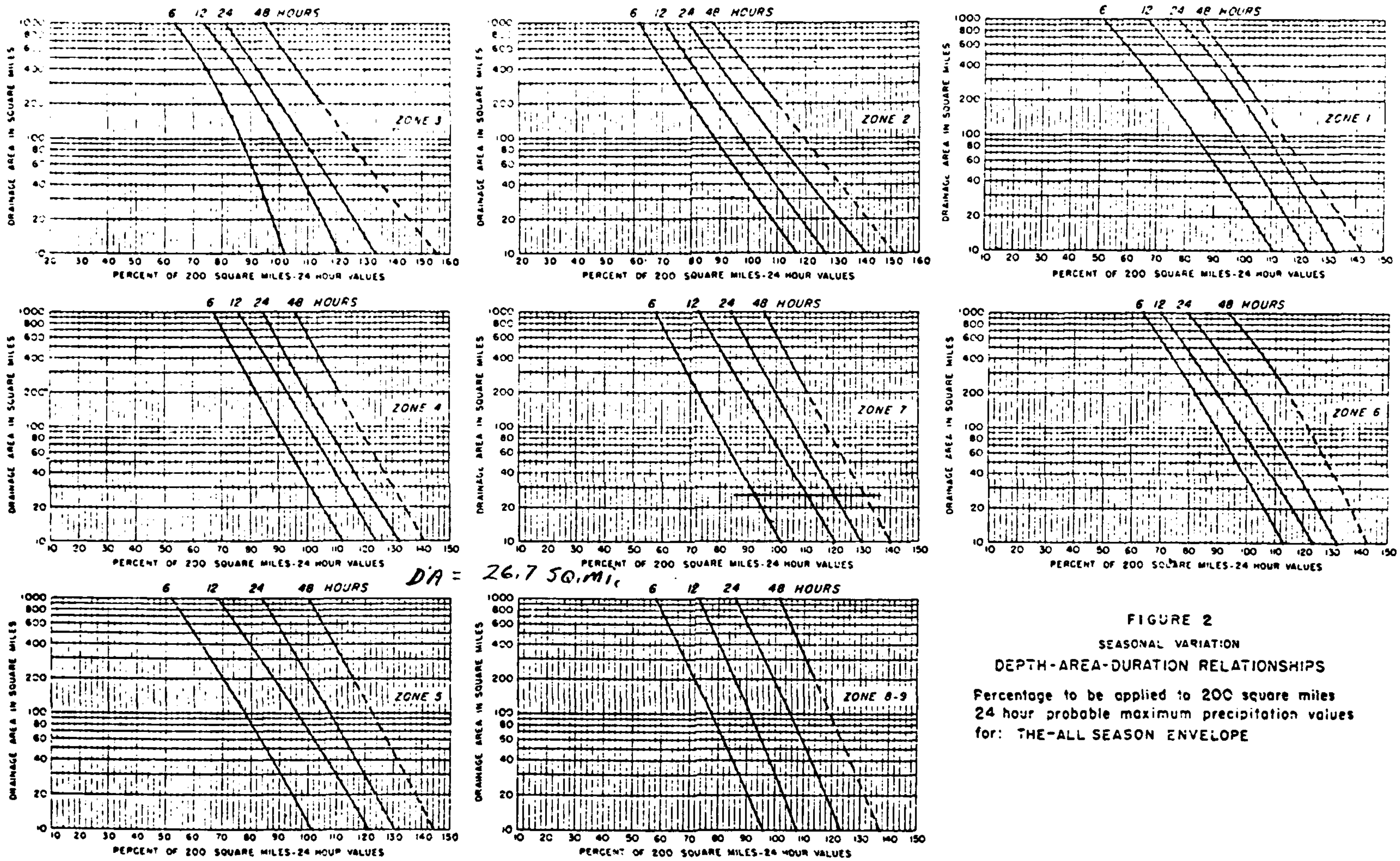


FIGURE 2

SEASONAL VARIATION

DEPTH-AREA-DURATION RELATIONSHIPS

Percentage to be applied to 200 square miles
24 hour probable maximum precipitation values
for: THE-ALL SEASON ENVELOPE

ENGINEERING CONSULTANTS, INC.

Dam Safety Inspection - Missouri — SHEET NO. 1 OF

David R. Wilson Dam (10242) — JOB NO. 1240

Unit Hydrograph Parameters — BY PRW — DATE 9-17

KLB

1.) Drainage Area = 17114 Ac = 26.7 sq mi.

2.) Length of Stream = 3.15" × $\frac{62500}{12}$ = 16406 Ft. = 3.11 Mi

3.) Elevation at Drainage Divide, H_1 = 844 Ft.
(Average)

4.) Reservoir Elevation at Spillway Crest, H_2 = 755.67 Ft.

5.) Difference in Elevation, $\Delta H = H_1 - H_2$ = 844 − 755.67 = 88.33 Ft.

6.) Average Slope of Stream, $S = \frac{H_{85} - H_{10}}{0.75L}$ = 15.41 ft/mi = 0.29%

7.) Time of Concentration:

a) By Kirpich Formula:

$$T_c = \left(\frac{11.9 \times L^3}{\Delta H}\right)^{0.385} = \left(\frac{11.9 \times 3.11^3}{88.33}\right)^{0.385} =$$

T_c = 1.71 hr.

b) By Velocity Estimate:

Average Slope = 0.29% → Say V = 2 ft/sec.

$$T_c = \frac{L}{V} = \frac{16406}{2 \times 3600} = 2.28 \text{ hr.}$$

Use T_c = 1.71 hr.

8.) Lag Time = 0.6 × T_c = 0.6 × 1.71 hr = 1.03 hr.

9.) Unit Duration $D \le \frac{L_t}{3} = \frac{1.03}{3}$ = 0.34

Use D = 20 min. = 0.33 hr.

10.) Time to Peak, $T_p = \frac{D}{2} + L_t = \frac{0.33}{2} + 1.03$ = 1.195 hR.

11.) Peak Discharge = $Q_p = \frac{484 \times A}{T_p} = \frac{484 \times 26.7}{1.195}$

Q_p = 10,814 cfs.

ECI-4 PRC ENGINEERING CONSULTANTS, INC.

DAM SAFETY INSPECTION - MISSOURI SHEET NO. 1 OF

DAVID R. WILLSON DAM (10242) JOB NO. 1240-001-1

SOIL GROUP AND CURVE NUMBER DETERMINATION BY KLB DATE 8-2

DAVID R. WILSON DAM (10242)

HYDROLOGIC SOIL GROUP AND CURVE NUMBER

1. WATERSHED SOILS IN THIS BASIN CONSIST PRIMARILY OF GROUP D SOILS. ASSUME GROUP D FOR HYDROLOGIC PURPOSES FOR THE ENTIRE WATERSHED.

2. THIS WATERSHED IS PRIMARILY PASTURE AND RANGE LAND. ASSUME THE HYDROLOGIC CONDITION OF THIS WATERSHED IS "FAIR".

THUS CN = 84 (PASTURE AND RANGE) WITH AMC II

⇒ CN = 93 WITH AMC III

PRC ENGINEERING CONSULTANTS, INC.

DAM SAFETY INSPECTION — MISSOURI SHEET NO. 1 OF 1

DAVID R. WILSON DAM (MO. 10242) JOB NO. 1240-001

100-YEAR FLOOD BY REGRESSION EQUATION BY MAS DATE 12-

DAVID R. WILSON DAM

100-YEAR FLOOD BY REGRESSION EQUATION

Regression Equation for 100-year flood for Missouri:

$$Q_{100} = 85.1 A^{0.934} A^{-0.02} S^{0.576}$$

(Reference: USGS Open File Report: "Technique for Estimating the Magnitude and Frequency of Missouri Floods — by Leland D. Hauth, 1974)

Where:

A = Drainage Area in Sq. mi.

S = Main channel Slope, ft/mi. (Avg. Slope between points 10, and 85 percent of the distance along main-stream channel from the site to the basin divide).

For David R. Wilson Dam:

A = 26.7 Sq. mi, and

S = 15.41 ft/mi.

Thus:

$$Q_{100} = 85.1\,(26.7)^{0.934\,(26.7)^{-0.02}}\,(15.41)^{0.576}$$

$$= \underline{7274 \text{ cfs}}$$

HEC1DB INPUT DATA

```
**************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION 26 FEB 79
**************************************
A1                 DAM SAFETY INSPECTION - MISSOURI
A2                   DAVID R WILSON DAM  (MO.13242)
A3                    PMF AND 50 PERCENT PMF
B     300       0      20       0       0       0       0       0       0       0
B1      5
J       1       2       1
J1      1      .5
K       0   13242                                       1
K1  INPUT PRECIPITATION VALUES, RATIOS AND UNIT HYDROGRAPH PARAMETERS
M       1       2    26.7            26.7       1                       1
P            24.3    92.2   110.8   120.4
T                                                      -1     -.05
W2            1.6
X       2       .       1
K       1   13242                                       1
K1  ROUTE HYDROGRAPH THROUGH DAVID R WILSON DAM
Y                                1       1
Y1      1                                           -755.67      -1
Y4755.67   756.00  758.00  759.00  761.00  762.00  764.00  766.00  767.00
Y5      0      43     142    1126 [illegible]    5477   22700   52384 [illegible]
$S      0    1347 [illegible]  20293   23325   64944
$E    737     740  755.67     760     762     780
$$755.67
$D    762
[illegible]
```

INFLOW PMF AND ONE-HALF PMF HYDROGRAPHS

```
PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

     RUNOFF HYDROGRAPH AT        10242
     ROUTE HYDROGRAPH TO         10242
     END OF NETWORK
```

```
*************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
*************************************

RUN  DATE* 79/12/21.
     TIME* 11.29.[illegible]

                    DAM SAFETY INSPECTION - MISSOURI
                      DAVID R. WILSON DAM  (MO.10242)
                         PMF AND [illegible] PERCENT PMF

                              JOB SPECIFICATION
   NQ    NHR    NMIN   IDAY    IHR    IMIN   METRC   IPLT   IPRT   NSTAN
  [illegible]  [illegible]  [illegible]   0      0      0      0      0      0      0
                        JOPER    NWT   LROPT   TRACE
                         [illegible]  [illegible]   0       0

                  MULTI-PLAN ANALYSES TO BE PERFORMED
                      NPLAN= 1 NRTIO= 2 LRTIO= 1
       RTIOS=   1.00    .50

**********     **********     **********     **********     **********

                       SUB-AREA RUNOFF COMPUTATION

   INPUT PRECIPITATION VALUES, RATIOS AND UNIT HYDROGRAPH PARAMETERS

         ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
         1 [illegible]    0       1       0       0       0       1       0       0

                              HYDROGRAPH DATA
   IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
     1       2    [illegible]   0.00   26.70    1.00   0.000     0       1       0

                              PRECIP DATA
         SPFE     PMS      R6     R12     R24     R48     R72     R96
         0.00   24.30   92.20  112.00  120.40    0.00    0.00    0.00

                               LOSS DATA
 LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
   0     0.00    0.00    1.00    0.00    0.00    1.00   -1.00  -93.00    0.00    0.00

     CURVE NO =  -93.00  WETNESS =   -1.00  EFFECT CN =   93.00

                          UNIT HYDROGRAPH DATA
                     TC=  0.00    LAG=  1.03

                            RECESSION DATA
            STRTQ=    0.00    QRCSN=    0.00    RTIOR= 1.00

   UNIT HYDROGRAPH 17 END OF PERIOD ORDINATES, TC=    0.00 HOURS, LAG=   1.03  VOL= 1.00
 1879.    6230.   10745.   10569.    8430.    5263.    3295.    2137.    1353.     853.
  541.     346.     219.     140.      95.      59.      29.
```

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.20	1	.05	[illegible]	.05	0.	1.03	2.20	151	0.00	0.00	0.00	0.
1.01	.40	2	.05	[illegible]	.05	0.	1.03	2.40	152	0.00	0.00	0.00	0.
1.01	1.00	3	.05	.00	.05	0.	1.03	3.00	153	0.00	0.00	0.00	0.
1.01	1.20	4	.05	.00	.05	7.	1.03	3.20	154	0.00	0.00	0.00	0.
1.01	1.40	5	.05	.01	.04	43.	1.03	3.40	155	0.00	0.00	0.00	0.
1.01	2.00	6	.05	.01	.04	129.	1.03	4.00	156	0.00	0.00	0.00	0.
1.01	2.20	7	.05	.02	.04	255.	1.03	4.20	157	0.00	0.00	0.00	0.
1.01	2.40	8	.05	.02	.03	441.	1.03	4.40	158	0.00	0.00	0.00	0.
1.01	3.00	9	.05	.02	.03	628.	1.03	5.00	159	0.00	0.00	0.00	0.
1.01	3.20	10	.05	.03	.02	812.	1.03	5.20	160	0.00	0.00	0.00	0.
1.01	3.40	11	.05	.03	.02	944.	1.03	5.40	161	0.00	0.00	0.00	0.
1.01	4.00	12	.05	.03	.02	1143.	1.03	6.00	162	0.00	0.00	0.00	0.
1.01	4.20	13	.05	.03	.02	1281.	1.03	6.20	163	0.00	0.00	0.00	0.
1.01	4.40	14	.05	.03	.02	1406.	1.03	6.40	164	0.00	0.00	0.00	0.
1.01	5.00	15	.05	.04	.02	1517.	1.03	7.00	165	0.00	0.00	0.00	0.
1.01	5.20	16	.05	.04	.02	1615.	1.03	7.20	166	0.00	0.00	0.00	0.
1.01	5.40	17	.05	.04	.01	1702.	1.03	7.40	167	0.00	0.00	0.00	0.
1.01	6.00	18	.05	.04	.01	1779.	1.03	8.00	168	0.00	0.00	0.00	0.
1.01	6.20	19	.25	.22	.03	2141.	1.03	8.20	169	0.00	0.00	0.00	0.
1.01	6.40	20	.25	.21	.04	2217.	1.03	8.40	170	0.00	0.00	0.00	0.
1.01	7.00	21	.25	.22	.03	[illegible]	1.03	9.00	171	0.00	0.00	0.00	0.
1.01	7.20	22	.25	.23	.02	6311.	1.03	9.20	172	0.00	0.00	0.00	0.
1.01	7.40	23	.25	.23	.02	8554.	1.03	9.40	173	0.00	0.00	0.00	0.
1.01	8.00	24	.25	.23	.02	9701.	1.03	10.00	174	0.00	0.00	0.00	0.
1.01	8.20	25	.25	.24	.01	10569.	1.03	10.20	175	0.00	0.00	0.00	0.
1.01	8.40	26	.25	.24	.01	11294.	1.03	10.40	176	0.00	0.00	0.00	0.
1.01	9.00	27	.25	.24	.01	11514.	1.03	11.00	177	0.00	0.00	0.00	0.
1.01	9.20	28	.25	.24	.01	11919.	1.03	11.20	178	0.00	0.00	0.00	0.
1.01	9.40	29	.25	.24	.01	12044.	1.03	11.40	179	0.00	0.00	0.00	0.
1.01	10.00	30	.25	.24	.01	12212.	1.03	12.00	180	0.00	0.00	0.00	0.
1.01	10.20	31	.25	.24	.01	12339.	1.03	12.20	181	0.00	0.00	0.00	0.
1.01	10.40	32	.25	.25	.01	12436.	1.03	12.40	182	0.00	0.00	0.00	0.
1.01	11.00	33	.25	.25	.01	12516.	1.03	13.00	183	0.00	0.00	0.00	0.
1.01	11.20	34	.25	.25	.00	12577.	1.03	13.20	184	0.00	0.00	0.00	0.
1.01	11.40	35	.25	.25	.00	12625.	1.03	13.40	185	0.00	0.00	0.00	0.
1.01	12.00	36	.25	.25	.00	12662.	1.03	14.00	186	0.00	0.00	0.00	0.
1.01	12.20	37	.75	.74	.01	13592.	1.03	14.20	187	0.00	0.00	0.00	0.
1.01	12.40	38	.75	.74	.01	16669.	1.03	14.40	188	0.00	0.00	0.00	0.
1.01	13.00	39	.75	.74	.01	21717.	1.03	15.00	189	0.00	0.00	0.00	0.
1.01	13.20	40	.90	.89	.01	27207.	1.03	15.20	190	0.00	0.00	0.00	0.
1.01	13.40	41	.90	.89	.01	32326.	1.03	15.40	191	0.00	0.00	0.00	0.
1.01	14.00	42	.90	.89	.00	36490.	1.03	16.00	192	0.00	0.00	0.00	0.
1.01	14.20	43	1.12	1.12	.00	40123.	1.03	16.20	193	0.00	0.00	0.00	0.
1.01	14.40	44	1.12	1.12	.00	43968.	1.03	16.40	194	0.00	0.00	0.00	0.
1.01	15.00	45	1.12	1.12	.00	47646.	1.03	17.00	195	0.00	0.00	0.00	0.
1.01	15.20	46	1.95	1.95	.00	52490.	1.03	17.20	196	0.00	0.00	0.00	0.
1.01	15.40	47	5.36	5.36	.01	66460.	1.03	17.40	197	0.00	0.00	0.00	0.
1.01	16.00	48	1.19	1.19	.00	90138.	1.03	18.00	198	0.00	0.00	0.00	0.
1.01	16.20	49	1.05	1.04	.00	108604.	1.03	18.20	199	0.00	0.00	0.00	0.
1.01	16.40	50	1.05	1.04	.00	108696.	1.03	18.40	200	0.00	0.00	0.00	0.
1.01	17.00	51	1.05	1.04	.00	96776.	1.03	19.00	201	0.00	0.00	0.00	0.
1.01	17.20	52	.82	.82	.00	80490.	1.03	19.20	202	0.00	0.00	0.00	0.
1.01	17.40	53	.82	.82	.00	59066.	1.03	19.40	203	0.00	0.00	0.00	0.
1.01	18.00	54	.82	.82	.00	[illegible]	1.03	20.00	204	0.00	0.00	0.00	0.
1.01	18.20	55	.08	[illegible]	.00	[illegible]	1.03	20.20	205	0.00	0.00	0.00	0.
1.01	18.40	56	.00	.08	.00	44084.	1.03	20.40	206	0.00	0.00	0.00	0.

1.01	19.00	57	.08	.08	.00	13615.	1.03	21.00	207	0.00	0.00	0.00	0.
1.01	19.20	58	.08	.08	.00	24135.	1.03	21.20	208	0.00	0.00	0.00	0.
1.01	19.40	59	.08	.08	.00	16606.	1.03	21.40	209	0.00	0.00	0.00	0.
1.01	20.00	60	.08	.08	.00	11985.	1.03	22.00	210	0.00	0.00	0.00	0.
1.01	20.20	61	.08	.08	.00	9112.	1.03	22.20	211	0.00	0.00	0.00	0.
1.01	20.40	62	.08	.08	.00	7211.	1.03	22.40	212	0.00	0.00	0.00	0.
1.01	21.00	63	.08	.08	.00	5964.	1.03	23.00	213	0.00	0.00	0.00	0.
1.01	21.20	64	.08	.08	.00	5154.	1.03	23.20	214	0.00	0.00	0.00	0.
1.01	21.40	65	.08	.08	.00	4716.	1.03	23.40	215	0.00	0.00	0.00	0.
1.01	22.00	66	.08	.08	.00	4438.	1.04	0.00	216	0.00	0.00	0.00	0.
1.01	22.20	67	.06	.06	.00	4261.	1.04	.20	217	0.00	0.00	0.00	0.
1.01	22.40	68	.08	.08	.00	4151.	1.04	.40	218	0.00	0.00	0.00	0.
1.01	23.00	69	.08	.08	.00	4087.	1.04	1.00	219	0.00	0.00	0.00	0.
1.01	23.20	70	.08	.08	.00	4035.	1.04	1.20	220	0.00	0.00	0.00	0.
1.01	23.40	71	.08	.05	.00	4017.	1.04	1.40	221	0.00	0.00	0.00	0.
1.02	0.00	72	.08	.08	.00	4015.	1.04	2.00	222	0.00	0.00	0.00	0.
1.02	.20	73	0.00	0.00	0.00	3872.	1.04	2.20	223	0.00	0.00	0.00	0.
1.02	.40	74	0.00	0.00	0.00	3394.	1.04	2.40	224	0.00	0.00	0.00	0.
1.02	1.00	75	0.00	0.00	0.00	2592.	1.04	3.00	225	0.00	0.00	0.00	0.
1.02	1.20	76	0.00	0.00	0.00	1770.	1.04	3.20	226	0.00	0.00	0.00	0.
1.02	1.40	77	0.00	0.00	0.00	1113.	1.04	3.40	227	0.00	0.00	0.00	0.
1.02	2.00	78	0.00	0.00	0.00	704.	1.04	4.00	228	0.00	0.00	0.00	0.
1.02	2.20	79	0.00	0.00	0.00	447.	1.04	4.20	229	0.00	0.00	0.00	0.
1.02	2.40	80	0.00	0.00	0.00	292.	1.04	4.40	230	0.00	0.00	0.00	0.
1.02	3.00	81	0.00	0.00	0.00	177.	1.04	5.00	231	0.00	0.00	0.00	0.
1.02	3.20	82	0.00	0.00	0.00	111.	1.04	5.20	232	0.00	0.00	0.00	0.
1.02	3.40	83	0.00	0.00	0.00	60.	1.04	5.40	233	0.00	0.00	0.00	0.
1.02	4.00	84	0.00	0.00	0.00	41.	1.04	6.00	234	0.00	0.00	0.00	0.
1.02	4.20	85	0.00	0.00	0.00	25.	1.04	6.20	235	0.00	0.00	0.00	0.
1.02	4.40	86	0.00	0.00	0.00	14.	1.04	6.40	236	0.00	0.00	0.00	0.
1.02	5.00	87	0.00	0.00	0.00	7.	1.04	7.00	237	0.00	0.00	0.00	0.
1.02	5.20	88	0.00	0.00	0.00	2.	1.04	7.20	238	0.00	0.00	0.00	0.
1.02	5.40	89	0.00	0.00	0.00	0.	1.04	7.40	239	0.00	0.00	0.00	0.
1.02	6.00	90	0.00	0.00	0.00	0.	1.04	8.00	240	0.00	0.00	0.00	0.
1.02	6.20	91	0.00	0.10	0.00	0.	1.04	8.20	241	0.00	0.10	0.00	0.
1.02	6.40	92	0.00	0.00	0.00	0.	1.04	8.40	242	0.00	0.00	0.00	0.
1.02	7.00	93	0.00	0.00	0.00	0.	1.04	9.00	243	0.00	0.00	0.00	0.
1.02	7.20	94	0.00	0.00	0.00	0.	1.04	9.20	244	0.00	0.00	0.00	0.
1.02	7.40	95	0.00	0.00	0.00	0.	1.04	9.40	245	0.00	0.00	0.00	0.
1.02	8.00	96	0.00	0.00	0.00	0.	1.04	10.00	246	0.00	0.00	0.00	0.
1.02	8.20	97	0.00	0.00	0.00	0.	1.04	10.20	247	0.00	0.00	0.00	0.
1.02	8.40	98	0.00	0.00	0.00	0.	1.04	10.40	248	0.00	0.00	0.00	0.
1.02	9.00	99	0.00	0.00	0.00	0.	1.04	11.00	249	0.00	0.00	0.00	0.
1.02	9.20	100	0.00	0.00	0.00	0.	1.04	11.20	250	0.00	0.00	0.00	0.
1.02	9.40	101	0.00	0.00	0.00	0.	1.04	11.40	251	0.00	0.00	0.00	0.
1.02	10.00	102	0.00	0.00	0.00	0.	1.04	12.00	252	0.00	0.00	0.00	0.
1.02	10.20	103	0.00	0.00	0.00	0.	1.04	12.20	253	0.00	0.00	0.00	0.
1.02	10.40	104	0.00	0.00	0.00	0.	1.04	12.40	254	0.00	0.00	0.00	0.
1.02	11.00	105	0.00	0.00	0.00	0.	1.04	13.00	255	0.00	0.00	0.00	0.
1.02	11.20	106	0.00	0.00	0.00	0.	1.04	13.20	256	0.00	0.00	0.00	0.
1.02	11.40	107	0.00	0.00	0.00	0.	1.04	13.40	257	0.00	0.00	0.00	0.
1.02	12.00	108	0.00	0.00	0.00	0.	1.04	14.00	258	0.00	0.00	0.00	0.
1.02	12.20	109	0.00	0.00	0.00	0.	1.04	14.20	259	0.00	0.00	0.00	0.
1.02	12.40	110	0.00	0.00	0.00	0.	1.04	14.40	260	0.00	0.00	0.00	0.
1.02	13.00	111	0.00	0.00	0.00	0.	1.04	15.00	261	0.00	0.00	0.00	0.
1.02	13.20	112	0.00	0.00	0.00	0.	1.04	15.20	262	0.00	0.00	0.00	0.
1.02	13.40	113	0.00	0.00	0.00	0.	1.04	15.40	263	0.00	0.00	0.00	0.
1.02	14.00	114	0.00	0.00	0.00	0.	1.04	16.00	264	0.00	0.00	0.00	0.
1.02	14.20	115	0.00	0.00	0.00	0.	1.04	16.20	265	0.00	0.00	0.00	0.
1.02	14.40	116	0.00	0.00	0.00	0.	1.04	16.40	266	0.00	0.00	0.00	0.

1.02	15.00	117	0.00	0.00	0.00	0.		1.04	17.00	267	0.00	0.00	0.00	0.
1.02	15.20	118	0.00	0.00	0.00	0.		1.04	17.20	268	0.00	0.00	0.00	0.
1.02	15.40	119	0.00	0.00	0.00	0.		1.04	17.40	269	0.00	0.00	0.00	0.
1.02	16.00	120	0.00	0.00	0.00	0.		1.04	18.00	270	0.00	0.00	0.00	0.
1.02	16.20	121	0.00	0.00	0.00	0.		1.04	18.20	271	0.00	0.00	0.00	0.
1.02	16.40	122	0.00	0.00	0.00	0.		1.04	18.40	272	0.00	0.00	0.00	0.
1.02	17.00	123	0.00	0.00	0.00	0.		1.04	19.00	273	0.00	0.00	0.00	0.
1.02	17.20	124	0.00	0.00	0.00	0.		1.04	19.20	274	0.00	0.00	0.00	0.
1.02	17.40	125	0.00	0.00	0.00	0.		1.04	19.40	275	0.00	0.00	0.00	0.
1.02	18.00	126	0.00	0.00	0.00	0.		1.04	20.00	276	0.00	0.00	0.00	0.
1.02	18.20	127	0.00	0.00	0.00	0.		1.04	20.20	277	0.00	0.00	0.00	0.
1.02	18.40	128	0.00	0.00	0.00	0.		1.04	20.40	278	0.00	0.00	0.00	0.
1.02	19.00	129	0.00	0.00	0.00	0.		1.04	21.00	279	0.00	0.00	0.00	0.
1.02	19.20	130	0.00	0.00	0.00	0.		1.04	21.20	280	0.00	0.00	0.00	0.
1.02	19.40	131	0.00	0.00	0.00	0.		1.04	21.40	281	0.00	0.00	0.00	0.
1.02	20.00	132	0.00	0.00	0.00	0.		1.04	22.00	282	0.00	0.00	0.00	0.
1.02	20.20	133	0.00	0.00	0.00	0.		1.04	22.20	283	0.00	0.00	0.00	0.
1.02	20.40	134	0.00	0.00	0.00	0.		1.04	22.40	284	0.00	0.00	0.00	0.
1.02	21.00	135	0.00	0.00	0.00	0.		1.04	23.00	285	0.00	0.00	0.00	0.
1.02	21.20	136	0.00	0.00	0.00	0.		1.04	23.20	286	0.00	0.00	0.00	0.
1.02	21.40	137	0.00	0.00	0.00	0.		1.04	23.40	287	0.00	0.00	0.00	0.
1.02	22.00	138	0.00	0.00	0.00	0.		1.05	0.00	288	0.00	0.00	0.00	0.
1.02	22.20	139	0.00	0.00	0.00	0.		1.05	.20	289	0.00	0.00	0.00	0.
1.02	22.40	140	0.00	0.00	0.00	0.		1.05	.40	290	0.00	0.00	0.00	0.
1.02	23.00	141	0.00	0.00	0.00	0.		1.05	1.00	291	0.00	0.00	0.00	0.
1.02	23.20	142	0.00	0.00	0.00	0.		1.05	1.20	292	0.00	0.00	0.00	0.
1.02	23.40	143	0.00	0.00	0.00	0.		1.05	1.40	293	0.00	0.00	0.00	0.
1.03	0.00	144	0.00	0.00	0.00	0.		1.05	2.00	294	0.00	0.00	0.00	0.
1.03	.20	145	0.00	0.00	0.00	0.		1.05	2.20	295	0.00	0.00	0.00	0.
1.03	.40	146	0.00	0.00	0.00	0.		1.05	2.40	296	0.00	0.00	0.00	0.
1.03	1.00	147	0.00	0.00	0.00	0.		1.05	3.00	297	0.00	0.00	0.00	0.
1.03	1.20	148	0.00	0.00	0.00	0.		1.05	3.20	298	0.00	0.00	0.00	0.
1.03	1.40	149	0.00	0.00	0.00	0.		1.05	3.40	299	0.00	0.00	0.00	0.
1.03	2.00	150	0.00	0.00	0.00	0.		1.05	4.00	300	0.00	0.00	0.00	0.

SUM 29.26 28.37 .88 1465874.
(743.)(721.)(22.)(41508.93)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	128696.	60570.	20342.	6786.	1465874.
CMS	3378.	1715.	576.	192.	41509.
INCHES		21.11	28.35	28.37	28.37
MM		536.03	720.06	720.67	720.67
AC-FT		30036.	40348.	40382.	40382.
THOUS CU M		37049.	49768.	49811.	49811.

HYDROGRAPH AT STA.10292 FOR PLAN 1, RTIO 1

0.	0.	0.	7.	43.	128.	266.	441.	620.	812.
984.	1146.	1281.	1425.	1517.	1515.	1797.	1779.	2111.	3217.
4935.	6911.	6555.	9701.	10509.	11094.	11514.	11819.	12044.	12212.
12339.	12438.	12515.	12577.	12625.	12662.	13592.	16669.	21717.	27207.
32326.	36480.	40125.	43868.	47646.	52490.	66460.	90136.	104609.	108696.
96774.	80090.	69866.	60820.	53093.	44004.	33615.	24925.	16606.	11987.
9112.	7211.	5954.	5154.	4716.	4438.	4261.	4181.	4082.	4036.
4015.	4015.	3872.	3386.	2597.	1770.	1113.	704.	449.	282.
177.	111.	69.	42.	23.	14.	7.	2.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	[illegible]	[illegible]	[illegible]342.	[illegible]	[illegible]
CMS	[illegible]	171.	376.	1[illegible]2.	[illegible]
INCHES		21.1[illegible]	2[illegible]	2[illegible]	2[illegible]
MM		536.0[illegible]	720.[illegible]	720.67	72[illegible].67
AC-FT		[illegible]36.	4[illegible]	4[illegible]	4[illegible]342.
THOUS CU M		[illegible]49.	4975[illegible].	4[illegible]11.	49811.

HYDROGRAPH AT STA 13[illegible]42 FOR PLAN 1, RTIO [illegible]

1.	0.	[illegible]	4.	21.	54.	17[illegible].	[illegible]	31[illegible].	406.
492.	7.	64[illegible].	[illegible]	758.	[illegible]07.	8[illegible].	[illegible]	[illegible]	1409.
2437.	3456.	4[illegible].	[illegible]	5254.	[illegible]	[illegible]	5910.	[illegible]	[illegible]
3170.	6219.	[illegible]	[illegible]	6313.	6331.	[illegible]	[illegible]	[illegible]	13633.
[illegible]	18249.	2[illegible].	[illegible]	23825.	[illegible]45.	33233.	45[illegible].	54302.	54349.
48389.	49245.	34[illegible].	[illegible]	26542.	22[illegible]2.	16807.	12[illegible]12.	8305.	5393.
4555.	3405.	2442.	[illegible]77.	2354.	2[illegible]19.	2131.	2076.	224[illegible].	2016.
2607.	[illegible]	1236.	159[illegible].	129[illegible].	885.	556.	352.	224.	141.
39.	56.	35.	21.	17.	7.	3.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	54340.	30286.	10171.	3393.	732937.
CMS	1539.	858.	288.	96.	20754.
INCHES		10.55	14.17	14.19	14.19
MM		268.01	360.33	360.34	360.34
AC-FT		15918.	20174.	20191.	20191.
THOUS CU M		19524.	24884.	24905.	24905.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH DAVID R WILSO, DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
10242	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-756.	-1

STAGE	755.67	756.00	756.50	758.00	760.00	762.00	764.00	766.00	767.00
FLOW	0.00	43.00	242.00	1126.00	[illegible]	5473.00	22769.00	52394.00	70351.00

CAPACITY=	0.	1347.	14492.	23293.	23325.	64844.
ELEVATION=	732.	740.	756.	760.	762.	780.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
755.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
762.0	0.0	0.0	0.

STATION 10242, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	1.	2.	3.	5.
8.	10.	14.	17.	21.	25.	29.	34.	39.	53.
86.	134.	196.	281.	400.	525.	655.	787.	922.	1057.
1232.	1448.	1661.	1872.	2080.	2285.	2495.	2740.	3063.	3535.
4109.	4774.	5640.	9211.	12800.	16460.	20684.	25581.	40167.	51293.
61051.	66398.	68022.	67425.	65395.	62130.	57610.	52068.	46926.	41624.
36575.	31959.	27836.	24287.	21751.	20065.	18622.	17116.	15640.	14683.
13636.	12691.	11832.	11026.	10237.	9446.	8560.	7698.	7175.	6510.
5893.	5401.	5323.	5208.	5074.	4982.	4873.	4756.	4662.	4559.
4459.	4361.	4266.	4172.	4090.	3991.	3903.	3817.	3730.	3652.
3571.	3493.	3416.	3341.	3268.	3195.	3126.	3067.	2995.	2937.

SUMMARY OF PMF AND ONE-HALF PMF FLOOD ROUTING

PEA[illegible] FLOW AND STORAGE (E[illegible] PERIOD) SUMMARY FOR MULTI[illegible] PLAN-RATI[illegible] ECONOMIC COMPUTATIONS
FLOW[illegible] IN CUBIC FEET PER SE[illegible] (CUBIC METERS PE[illegible] SECOND)
A[illegible]A I[illegible] SQUARE MILES (SQUARE KILOMET[illegible])

RATIOS APPLIED T[illegible]

OPERATION	STAT[illegible]	AREA	PLAN	RATIO 1 1.0	RATIO [illegible] .[illegible]
HYDROGRAPH AT	[illegible]	[illegible].70	1	1336[illegible].	5[illegible].
		([illegible].15)		(3[illegible]77.[illegible])(	15[illegible].[illegible])(
ROUTED TO	1[illegible]2[illegible]	[illegible].7[illegible]	1	[illegible].	[illegible]165.
		([illegible].1[illegible])		(1[illegible]2[illegible].16)(	27.[illegible])(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	[illegible]55.67	7[illegible]	76[illegible]
STORAGE	144[illegible]2.	14432.	[illegible]
OUTFLOW	0.	0.	[illegible]

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	76[illegible]	4.87	[illegible]55[illegible].	[illegible]22.	13.[illegible]	17.[illegible]	[illegible].00
.[illegible]	76[illegible]	1.[illegible]	[illegible]777.	2165.	[illegible]	1[illegible]	[illegible]

PERCENT OF PMF FLOOD ROUTING
EQUAL TO SPILLWAY CAPACITY

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PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

         RUNOFF HYDROGRAPH AT          10242
         ROUTE HYDROGRAPH TO           10242
         END OF NETWORK
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*************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  26 FEB 79
*************************************

RUN DATE= ../12/31.
    TIME= 11.28.1..

                        DAM SAFETY INSPECTION - MISSOURI
                         DAVID R WILSON DAM ID(MO.10242)
                               PERCENT PMF

                              JOB SPECIFICATION
      NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     300        0       20        0        0        0        0        0        4        0
                              JOPER      NWT    LROPT    TRACE
                                  5        0        0        0

                       MULTI-PLAN ANALYSES TO BE PERFORMED
                          NPLAN= 1 NRTIO= 9 LRTIO= 1
          RTIOS=    .21     .22     .23     .24     .25     .26     .27     .28     .29

   *********         *********         *********         *********         *********

                          SUB-AREA RUNOFF COMPUTATION

         INPUT PRECIPITATION VALUES, RATIOS AND UNIT HYDROGRAPH PARAMETERS

                   ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                   1024L       0       0       0       0       0       1       0       0

                                 HYDROGRAPH DATA
          IHYDG   IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
              1      2   26.73    0.00   26.73    1.00   1.000       0       1       0

                                  PRECIP DATA
                 SPFE     PMS      R6     R12     R24     R48     R72     R96
                 0.00   24.30  102.20  110.80  120.40    0.00    0.00    0.00

                                   LOSS DATA
      LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
          0    0.00    0.00    1.00    0.00    0.00    1.00   -1.00  -93.00    0.00    0.00

         CURVE NO = -93.00   WETNESS =   -1.00   EFFECT CN =   93.00

                              UNIT HYDROGRAPH DATA
                           TC=  0.00    LAG=  1.03

                                 RECESSION DATA
                   STRTQ=    .00    QRCSN=    0.00    RTIOR= 1.00

                              END-OF-PERIOD FLOW
  MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q    MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q
```

SUM 20.26 20.37 [illegible] 1465874.
(747.)(721.)([illegible])(41508.93)

*********** *********** *********** *********** ***********

HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THRU [illegible] AM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1[illegible]42	[illegible]	[illegible]	[illegible]	[illegible]	0	1	0	[illegible]

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.0[illegible]	0.0[illegible]	1	1	0	[illegible]		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	[illegible]	[illegible]	0.000	0.000	[illegible]	-756.	-1

STAGE	755.[illegible]	756.[illegible]	75[illegible].50	758.0[illegible]	76[illegible].00	7[illegible]	7[illegible].00	76[illegible]	767.00
FLOW	0.0[illegible]	45.00	24[illegible]	1126.00	3[illegible]	5[illegible]	22763.0[illegible]	[illegible]384.00	70351.60

CAPACITY=	[illegible].	1[illegible]7.	144[illegible].	2[illegible].	[illegible]125.	69[illegible].
ELEVATION=	732.	74[illegible].	[illegible].	76[illegible].	76[illegible].	79[illegible].

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
7[illegible].7	0.0	0.0	0.	[illegible]	0.0	0.0	[illegible]

DAM DATA

TOPEL	COQD	EXPD	DAMWID
762.0	[illegible]	0.0	[illegible].

PEAK OUTFLOW IS [illegible]17. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 4059. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 4300. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 4540. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 4781. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 5021. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 5261. AT TIME 19.67 HOURS

PEAK OUTFLOW IS 5585. AT TIME 19.67 HOURS

[illegible]

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1 .2[illegible]	RATIO 2 .22	RATIO 3 .2[illegible]	RATIO 4 .2[illegible]	RATIO [illegible] .2	RATIO 5 .26	RATIO 7 .27	RATIO 8 .28	RATIO 9 .29
HYDROGRAPH AT	1[illegible]242	2[illegible].7[illegible]	1	22826.	23913.	25[illegible]00.	26087.	2717[illegible].	[illegible]261.	29348.	30435.	31522.
		(5[illegible].1[illegible])		(646.[illegible])	(677.[illegible])	(7[illegible].9[illegible])	(7[illegible]8.[illegible])	(76[illegible].[illegible])	(8[illegible].26)	([illegible]1.04)	(861.9[illegible])	(892.80)
ROUTED TO	1[illegible]24[illegible]	[illegible].70	1	[illegible]17.	4[illegible]5[illegible].	4300.	4[illegible].	4781.	5021.	[illegible]261.	5585.	655[illegible].
		([illegible].15)		(1[illegible].[illegible])	(11[illegible].[illegible])	([illegible].77)	([illegible].[illegible])	(1[illegible].[illegible])	([illegible]2.17)	(14[illegible].97)	(15[illegible].15)	(185.54)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	[illegible]	[illegible]	76?.30
STORAGE	[illegible]	[illegible]	233[illegible].
OUTFLOW	0.	0.	[illegible]

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
[illegible]	[illegible]	[illegible]	[illegible]71.	[illegible]	[illegible]	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]71.	[illegible]	0.00	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.67	0.00
[illegible]	[illegible]	.?0	[illegible]	4?40.	[illegible]	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.67	0.00
[illegible]	[illegible]	[illegible]	[illegible]	6??2.	[illegible]	19.33	0.00